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ABSTRACT

This issue of the EPA (Environmental Protection Agency) Journal focuses on environmental education and its role in building a sustainable future. Articles include: (1) "Why Environmental Education?" (Carol M. Browner); (2) "EPA's Environmental Education Program" (Diane Berger); (3) "Preparing for the Next Century" (John H. Chafee); (4) "The Environmental Education Advisory Council" (Arva Jackson); (5) "Where Are the Gaps in Environmental Education?" (David B. Rockland); (6) "GLOBE Partnership Launched" (Thomas N. Pyke, Jr.); (7) "Eco-Ed Grows in Brooklyn" (David Lutz); (8) "Problem Solving in Las Vegas" (Gregory Budd and Don Curry); (9) "The President's Environmental Youth Awards Program" (Doris Gillispie and Catharina Japikse); (10) "A Toolbox for Training Teachers" (Paul Nowak, Sr.); (11) "State Profiles in Environmental Education" (Abby Ruskey); (12) "Environmental Literacy and the College Curriculum" (Richard Wilke); (13) "Educating Environmental Managers for Tomorrow" (Julie Jubeir); (14) "Learning for Life in the 21st Century" (Noel J. Brown); (15) "Agenda 21's Plan for Education (from Chapter 36 of Agenda 21); (16) "Rescue Mission: Planet Earth" (David R. Woollcombe); (17) "A Comeback for Prospect Park" (Roy Popkin); and (18) "EPA Journal as a Classroom Tool" (Stephen Tchudi and Nancy Starnes). (JRH)

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Looking Ahead at Environmental Education

Only through education can we build a sustainable future

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EPA JOURNAL

A Magazine on National and Global Environmental Perspectives

Spring 1995 • Volume 21, Number 2 • EPA 175-N-95-003

United States
Environmental Protection Agency

Carol M. Browner
Administrator

Communications, Education, and Public Affairs

Loretta M. Ucelli
Associate Administrator

Miles Allen
Director of Editorial Services

Karen Flagstad, Ph.D.
Senior Editor

Catharina Japikse
Assistant Editor

Ruth Barker
Photo Editor

Marilyn Rogers
Circulation Manager

Andrew Mountain
Intern

Leighton Price
Editorial Consultant

Design Credits
Ron Farrah
James R. Ingram
Robert Flanagan

From the Editors

From kindergarten through junior and senior high school, from undergraduate college programs to graduate business schools and teacher-training seminars, environmental education is at work in the classroom in increasingly innovative and interdisciplinary ways. Almost by definition, environmental education lends itself to interdisciplinary study—a point that comes across in several articles in this magazine; among these is a "For the Classroom" piece on *EPA Journal* as an interdisciplinary teaching tool.

Perhaps more important, environmental education is not just for classrooms. In Brooklyn, New York, for example, it reaches into the urban community to teach appreciation of the built environment and urban community stewardship to adults and children. In Las Vegas, Nevada, Silverado High School students work with EPA scientists and practice environmental problem-solving in their community; as part of their work, they exchange e-mail with science teachers around the world. On several continents, elementary and junior- and senior-high-school students are participating in the newly launched GLOBE program by collecting real-world environmental data that feed into sophisticated computerized data bases that, in turn, will boost our collective scientific understanding of the planet.

How can we measure the success of environmental education? Its ultimate success cannot be measured in terms of projects, programs, or mandates, although clearly these are important means. As several of our contributors point out, the real success of environmental education is how well it translates into actions that are consistent with a sustainable future. ❑

Front cover: As part of the GLOBE program, students collect environmental data in the area around their school. They send their results over the Internet to scientists, who combine data from schools around the world into environmental maps, such as this one showing maximum air temperatures (background). Students then view and learn from the maps on their computers (inset). *(See article on page 14.)*

Inset picture by Steve Delaney, EPA. Computer map courtesy of GLOBE.

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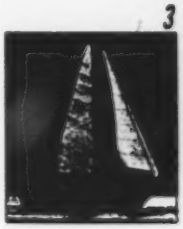


The U.S. Environmental Protection Agency is charged by Congress to protect the nation's land, air, and water systems. Under a mandate of national environmental laws, the Agency strives to formulate and implement actions which lead to a compatible balance between human activities and the ability of natural systems to support and nurture life. *EPA Journal* is published by EPA. The Administrator of EPA has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget. Views expressed by the authors do not necessarily reflect EPA policy. No permission needed to reproduce articles except those showing a specific copyright claim; no permission needed to reproduce photos credited to EPA. Contributions and inquiries are welcome and should be addressed to: Editor, *EPA Journal* (1704), Waterside Mall, 401 M Street, SW., Washington, DC 20460.

President Announces Regulatory Reforms

Launching a new era of partnership between regulators and the businesses they regulate, the President has announced landmark environmental, drug, and medical regulatory reforms that provide flexibility, demand accountability, and provide greater protection to the American people at lower cost. Joined by industry and environmental leaders, the President visited a print shop in Arlington, Virginia, to emphasize how the reforms will reduce the regulatory burden on businesses, especially small businesses. He announced a package of 25 environmental reforms, including changes that will reduce the number of toxic-emission forms the print shop owner must fill out from 20 to one. He also unveiled a set of reforms that will make drugs and medical devices available to consumers more quickly and cheaply.

Official White House photo.

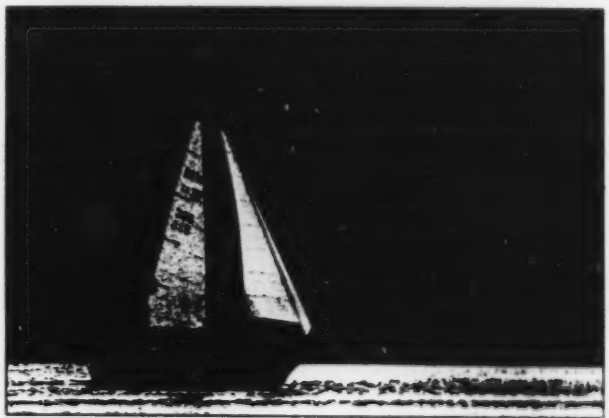
The New York Times reported: "... The Clinton Administration today said it would significantly broaden opportunities for industries to cut the costs of pollution control through a novel method that relies on free markets rather than regulations to decide where and how to clean up the environment. The proposal is one in a broad package of changes in environmental and other regulations the Administration put forth today. More than a year in the making, the package is a central part of the White House strategy for fending off a campaign by Congressional Republicans to roll back Federal rules governing health, safety and the environment .... Many of the proposals offered today deal with the mundane annoyances faced by businesses large and small, like the print shop Mr. Clinton chose as the setting for a speech today .... But other changes, like several planned by the Environmental Protection Agency, could save billions of dollars each year for major industries, like the chemical industry, officials said. The most notable would be the expansion of trading in pollution credits and allowances, a novelty introduced by the Clean Air Act of 1990 and until now mainly restricted to sulfur dioxide, the pollutant that contributes to acid rain. Citing the success of the acid rain program in lowering the costs of pollution control for electric utilities and other industries, the Administration said it would now adopt the same approach in its efforts to control smog and water pollution. Under this approach, companies that surpass pollution standards can earn extra credits that they may sell as if they were commodities like soybean futures or stock options. The credits could be bought by companies that are falling short of pollution standards. If the market works efficiently, the overall level of pollution will decline, but the gains will come at the lowest possible price. The details of the trading schemes have not yet been worked out, and in some cases, especially where water pollution is involved, they will be complicated to develop, agency officials conceded. ..."

The Los Angeles Times commented: "... Clinton visited a small print shop in Northern Virginia to unveil a number of steps that will reduce business paperwork, consolidate environmental rules and speed the approval of new medical devices and drug-manufacturing techniques. The event marked the first step in a year long campaign to reduce bureaucracy and narrow government intervention in private industry. The effort is being directed by Vice President Al Gore as the second phase of his 'reinventing government' initiative. ... [T]he Environmental Protection Agency will cut the paperwork burden on business by a fourth, combine reporting for air, water and solid waste emissions, broaden the ability of businesses to trade pollution credits and allow small businesses a six-month grace period to correct first-time pollution violations. ... The proposal would also allow small businesses who violate federal regulations to escape fines if they show good-faith efforts to comply. Another new rule would allow companies to apply money that previously would have been paid in fines to remedial efforts. Clinton said that the Republican approach—which would freeze all new federal regulations and require detailed cost-benefit analyses of all future federal rules—would endanger consumers and the nation's air and water. The GOP moratorium has passed the House but has not been acted on by the Senate. ..."

Great Lakes Water Quality Initiative Announced

A six-year collaborative effort between state agencies, industry, environmental and other citizen groups, municipalities, academia, and EPA has resulted in a comprehensive guidance document for restoring the health and economy of the Great Lakes. The document, called the Great Lakes Water Quality Initiative, provides the Great Lakes states and tribes with community-based flexibility to tailor solutions to local conditions. The Great Lakes supply drinking water for 23 million people and support agricultural, recreational, and industrial activities for many millions more. In announcing the initiative, Administrator Carol Browner said: "Today's plan embodies the principles that are at the heart of the Clinton Administration's approach to environmental protection: common sense, cost-effectiveness and a firm commitment to strong environmental goals combined with flexibility in how we reach those goals."

The Washington Post reported: ". . . The Great Lakes Water Quality Initiative establishes tolerance levels for 29 different pollutants, including such highly toxic chemicals as mercury and dioxin, in Lakes Superior, Michigan, Huron, Erie and Ontario. Industry and environmental groups long have been divided on the issue of how strict Great Lakes cleanup standards should be. Environmentalists point out that the lakes, which contain 95 percent of the country's fresh water and provide drinking water for 23 million Americans, are highly polluted. Industry groups counter that an overly strict cleanup plan could cost thousands of jobs. Twenty-five percent of U.S. industry is concentrated in the Great Lakes region. The plan comes at a time when the EPA faces a barrage of attacks from GOP lawmakers for devising programs that critics say are more costly to industry than they are of benefit to the public. State officials also complain that the agency is too rigid in its enforcement methods. In apparent response to the criticisms, the initiative was crafted to allow the eight states bordering the lakes an opportunity to establish their own criteria for industrial discharges. If state officials fail to devise plans within two years, the EPA will issue them instead. The plan also gives states the option of determining whether emissions into the lakes are best reduced only by regulating pollutants discharged in water. In order to reduce the lakes levels of mercury, for instance, which is believed to come largely from air particles, the states have the option of establishing stricter air-quality controls rather than more stringent water discharge rules. The states' share of the cost of the 20-year cleanup plan is likely to be about $100 million a year, EPA officials said. Without the plan's built-in flexibility, the states' cost could have been as high as $380 million a year, they said. The actual cost will depend on the pollution abatement programs that the states eventually adopt. The plan's architects reduced its projected cost by applying rigid cost-benefit analyses to the proposed cleanup standards and then, in response, relaxing some of them, EPA officials said. For example, the standards for mercury levels allowed in the lakes, originally stricter than those for mercury levels in air, were loosened and thus made achievable at a lower cost, the officials said. . . ."



Mike Brisson photo. Copyrighted

The Cleveland Plain Dealer commented: ". . . States have two years to find ways to meet the standards, which deal with 'point source' pollution—that is, dirty water or fluid discharged by industry. The plan does not address run-off from farm fields or the raw sewage that is dumped into water when sewers overflow during storms. If state officials fail to devise plans within two years, the EPA will issue them instead. The EPA wants to get rid of 22 chemicals that can remain in the water for 200 years. One such chemical, mercury, can cause kidney failure. Another, chlordane, may lead to anemia. To determine how many parts per million of a given toxin a factory can emit, states will have to measure the quality of surrounding waters. Anything that degrades existing water quality will have to stay in the factory. Browner and her allies—Sens. John Glenn of Ohio and Carl Levin of Michigan, and Indiana's Gov. Bayh—argued there was no time to lose. Forty million people get their drinking water from the five lakes. . . . Consumption of Great Lakes fish by pregnant women has been linked to developmental problems in children. Eagles and water birds eating the fish have suffered deformities. Although water quality has improved in recent years, some beaches are often closed and sediment amounting to poisonous mud lies at the bottom of many harbors and tributaries. Channel catfish caught in Lake Erie continue to be dangerous to eat, according to the Ohio Department of Natural Resources. Certain types of salmon and trout can be safely eaten only 12 times a year. 'We must never go back to the pollution and degradation of the past,' Browner said. 'We must keep going forward. . . .'"

National Research Council Endorses Changes to EPA Research

In an interim report, a committee of the National Research Council has concluded that changes now being made to EPA's research program will improve the program in many ways. The report cited as crucial the Agency's efforts to improve strategic planning for its research and development activities. Congress asked the council to assess the program last year when it approved EPA's $378 million research budget for fiscal 1995. The legislation prohibits the Agency from spending 75 percent of this budget until it receives the interim report and begins to implement the committee's recommendations. The committee has scheduled a final report for 1996. Administrator Carol Browner said: "I am very pleased that the report expresses clear support for the changes we have initiated. These changes will help us to achieve our goals for a quality science program that provides a strong foundation for environmental decision making."

Science magazine reported: ". . . Over its 25-year history, the Environmental Protection Agency (EPA) has been told many times that much of its science is second-rate and that the clean-up agency needs to clean up its act. Now this may be happening: In a report released earlier this month, the National Research Council (NRC) praises the agency's efforts to improve its research program. Over the past year, EPA administrator Carol Browner has initiated major changes, including reorganizing EPA's 12 main research labs to eliminate redundancies, strengthening peer review, doubling funds for extramural research to a proposed $85 million in 1996, and launching a highly popular graduate fellowship program (*Science*, 29 July 1994, p. 599). The NRC panel, convened last fall and chaired by Miami University President Paul Risser, concurred with the 'general scope and direction' of these changes. Still, it is pressing for even more. It says EPA's Office of Research and Development can do 'much better' at disseminating research results and demonstrating their pertinence to agency actions. And it complains that EPA has not given its science adviser—now research chief Robert Huggett . . . —enough clout. Says panel member Raymond Loehr, a civil engineering professor at the University of Texas and longtime agency adviser, 'There is still no clear signal from EPA that it values good science.' Huggett says the agency is working on tightening the links between research and policy. Staffers will be following up on each extramural grant to ensure that the research products—EPA reports—get to key agency officials. . . ."

Environmental Science and Technology said: ". . . Although Robert Huggett has headed EPA's Office of Research and Development for only a year, it has been a period of tremendous changes. Huggett is hammering out a more research-focused model for ORD: 'Our premise is that we are going to prioritize our research in order to reduce the uncertainty in risk assessment.' To reach that goal, Huggett is overseeing the reorganization of ORD's research laboratories into 'mega-labs' based on a risk assessment-risk management paradigm. At the same time, he has moved quickly to expand ORD's research horizons through increased funding for extramural research grants, a new graduate fellowship program, and strengthening ties with EPA program offices and with other agencies such as the National Science Foundation (NSF). Huggett is also answering criticism about the direction and quality of ORD's research by increasing support for peer-reviewed long-term research. . . ."

BNA Environment Reporter commented: ". . . The committee endorsed several changes EPA is making to improve the ORD program:

- Resources for long-term fundamental and anticipatory research are being increased approximately 30 percent to at least 50 percent of ORD's program resources, with corresponding reductions in applied products and technical services for EPA's regulatory and regional offices;

Release of Toxic Chemicals Down in '93

According to the latest Toxics Release Inventory (TRI), U.S. manufacturers released 2.8 billion pounds of toxic chemicals to the environment in 1993, a decline of 406 million pounds or 12.6 percent over 1992 and a decline of nearly 43 percent when compared to the base year of 1988.

The Emergency Planning and Community Right-to-Know Act of 1988 required manufacturers to report annually to EPA the amounts of 316 different chemicals they release into the environment. They must also report amounts they transfer to other facilities for disposal or recycling. EPA publishes the unedited data for use by individual citizens, public interest groups, state and local governments, and other interested parties.

The 1993 TRI shows that releases to land fell sharpest, down 15 percent from 1992. Air emissions were down 11 percent, especially emissions of ammonia and a variety of solvents. Discharges to rivers, lakes, and other bodies of water declined about two percent.

Although the amount of waste chemicals transferred from manufacturing plants to other facilities increased over 1992, most of the increase was in transfers for recycling—318 million pounds. Transfers for disposal were up by 61 million pounds; transfers to privately owned treatment works and other treatment facilities decreased.

The chemical manufacturing industry reported releases of 1.3 billion pounds for 1993, including underground injection of wastes. This represents 47 percent of total releases. Other top industries include primary metals (329 million pounds), paper (216 million pounds), transportation equipment (136 million pounds), and plastics (127 million pounds).

The 1993 TRI marks the third year in which EPA and

- EPA laboratories and assessment centers are being consolidated, and research management authority is being decentralized from headquarters to the laboratories;

- Annual funding is being increased from $21 million to $100 million for extramural, investigator-initiated, peer-reviewed competitive research grants and centers;

- Peer review practices are being strengthened and expanded; and

- A national program of 300 graduate fellowships is being created.

The National Research Council is planning to issue a final report on ORD programs in 1996. It will address the structure, funding, and long-term plans for EPA's research and development program, in addition to procedures for laboratory site review and research staff evaluation. . . ."

the states have asked manufacturers to report on efforts to reduce the amount of waste generated through pollution prevention and in-plant recycling. The latest data indicate that, while some facilities have chosen to recycle toxic chemicals instead of releasing them to the environment, the dramatic declines reported in earlier inventories have ended—for the second year in a row, the total amount of waste generated has increased slightly.

Ongoing Enforcement

Sterilant Testing Concludes With $3.1 Million in Penalties

Following through on its testing program to ensure the effectiveness of sterilants sold for health-protection purposes, EPA is seeking a total of $3.1 million in civil penalties against the registrants of eight sterilants and the registrants of two disinfectants that failed the tests. The enforcement action also includes a number of distributors who sold unregistered sterilants and disinfectants.

Sterilants are used in hospitals and in other dental, medical, and veterinary facilities to destroy spores, bacteria, fungi, and viruses, particularly on medical and surgical instruments and equipment. Disinfectants are also used in these facilities and in the home to control microorganisms. Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), sterilants and disinfectants must satisfy testing requirements for registration with EPA, and distributing or selling an unregistered product is an unlawful act.

The sterilants named in the complaint are: Clidox-S, Perfecto Germ-X/Ucarcide 602, Cetylcide-G, Wavicide-01, Wavicide-01 Concentrate, Alcide Expor, Alcide ABQ, and Wipe Out. The hospital disinfectants are Broadspec 128 and Broadspec 256. Most of these products have undergone label changes to reflect new use patterns.

The seven unregistered products include: Wipe Out Disinfectant Towlettes (8-by 12-inch folded wipes); Wipe Out Disinfectant Towlette (flat packs); QuicKit Biological Fluid Emergency Spill Kit; Wipe Out Household or Office Disinfectant Spray (12 ounces); Wipe Out Medi Disinfectant Wand; Wipe Out Infection Control Travel Kit; and Wipe Out Disinfectant Spray (2 ounces).

Steve Delaney photo, EPA

Oil Spills in Six States Charged to Koch Industries

EPA, the Department of Justice, and the Coast Guard have filed a civil suit against Koch Industries and several of its subsidiaries for unlawfully discharging millions of gallons of oil into the waters of six states. One of the largest and most environmentally harmful spills occurred in Corpus Christi Bay on the east coast of Texas, an area popular with college students on spring break. Other spills polluted waters, including wetlands, across the states of Kansas, Oklahoma, Texas, Louisiana, Missouri, and Alabama. Koch Industries, headquartered in Wichita, Kansas, operates pipelines that transport crude oil and related products from oil fields to refineries and tank farms. The spills occurred primarily as a result of breaks in gathering lines caused by erosion.

The action, filed in the U.S. District Court for the Southern District of Texas, charges that, since 1990, Koch and its subsidiaries were responsible for more than 300 separate oil spills. The suit is being brought under the Clean Water Act, as amended by the Oil Pollution Act. It seeks penalties and a court order requiring Koch to take such actions as are necessary to protect U.S. waters against future spills.

Laboratory studies show that even small amounts of oil—less than 1 part per million—can adversely affect a variety of organisms that provide food for fish. In addition, floating oil can asphyxiate fish and animals that live at the bottom of lakes and rivers (benthic fauna), harm waterfowl, and can cause economic loss by fouling shorelines and beaches. The spills in this case damaged waters, fish, and waterfowl in various bays, lakes, rivers, and streams. ❑

Why Environmental Education?

It is critical to maintaining our quality of life

by Carol M. Browner

In the past 25 years, environmental education has helped the people of this country to reach a new understanding. Today, more Americans than ever before understand that to ensure a good quality of life for ourselves and our children, we must act as responsible stewards of our air, our water, and our land.

Over the past generation, environmental education has helped this nation to harness the creativity, the imagination, and the tenacity of Americans from all walks of life and to put that creativity to work in the service of public health and our environment.

As a result, our nation has made tremendous progress in protecting public health and our environment. We no longer have rivers catching on fire. Our skies are cleaner. And U.S. environmental expertise and technology are in demand throughout the world.

But more remains to be done. If we are to meet the environmental challenges of the next 25 years, we must deepen environmental awareness among all Americans. And we must involve many more Americans in protecting our health and the world we live in.

The Clinton Administration is committed to building a new generation of environmental protection, in which those who are affected by environmental decisions have the maximum opportunity to help make those decisions.

An informed and involved local community always does a better job of environmental protection than some distant bureaucracy. If we are to move beyond environmental regulation to true environmental protection, Americans in businesses and communities throughout this country must be full and active participants in solving environmental problems.

Industry by industry, community by community, the Clinton Administration is creating new opportunities for all Americans to do what they can best do to protect what we all share.

Through our Common Sense Initiative, the Clinton Administration brings people to the table to put their heads together and find new solutions for major industries—to achieve results that are cleaner for the environment, cheaper for the taxpayer and industry, and smarter for the future of this country.

We are bringing people together to make tough decisions and find the solutions that work best for their community. In the San Francisco Bay Delta, for example, we ended 30 years of water wars by recognizing that the competing

(Browner is Administrator of EPA.)

The National Environmental Education Act of 1990 charged EPA with the responsibility for coordinating federal environmental education initiatives and for providing leadership at a national level to the public and private sectors. The act also mandated the creation of an office of environmental education within EPA and the operation of a number of environmental education programs and projects. As directed by Congress, EPA created an office at its Washington headquarters, which developed the following mission, goals, and programs with support from the 10 EPA regions.

Mission:

To advance and support national education efforts to develop an environmentally conscious and responsible public, and to inspire in all individuals a sense of personal responsibility for the care of the environment.

Goals:

- Expand communication and partnerships
- Educate youth to protect the environment
- Promote the pursuit of environmental careers
- Educate the adult public to increase environmental literacy
- Educate across international boundaries.

demands for scarce resources had to be solved not through continued confrontation, but by building consensus. Farmers, families, and fishermen—all have a right to water. We brought people together, and now all will have fair access to water resources.

Fundamental to full participation is public access to information. Our recent expansion of the community right-to-know program gives citizens more information about toxic pollution in their neighborhoods, so they have the tools to protect themselves, their children, and their community.

Environmental education is essential if Americans are to participate fully in solving environmental problems.

This issue of *EPA Journal* is packed with inspiring examples of how schools, universities, community organizations, businesses, and EPA are working to deepen environmental awareness across the country.

University educators are working to build environmental education into a wide variety of college courses and reach all students, not only those majoring in environmental sciences.

Young people are studying *Agenda 21*, the document put forth at the 1992 Earth Summit in Rio, and translating it into an environmental action manual for kids.

EPA's Environmental Education Program

—Diane Berger

Primary Programs and Partnerships:

• *Environmental Education Grants* are awarded by EPA to promote excellence and innovation in environmental education at the grassroots level. Each year, universities, schools, nonprofit organizations, and state, local, and tribal agencies compete across the nation to receive approximately $3 million to support local initiatives. In 1995, approximately 250 environmental education grants will be awarded, with much of the funding directed into small grants of approximately $5,000 each. These environmental education grants ensure that a large number of organizations receive seed-money to implement projects to close gaps in environmental education. When this year's grants are awarded, almost 1,000 innovative projects will have been supported by this program since it began in 1992.

• *An Environmental Teacher-Training Program* was established in 1992 through a three-year cooperative agreement between EPA and a consortium of universities and organizations headed by the University of Michigan. The consortium developed a program to provide educators with the materials and skills to infuse environmental education into existing curricula. Their materials for grades K-12 and their teacher workshops have been well received by the educators involved in the training. EPA has solicited applications for the next three-year cooperative agreement and is currently evaluating the submitted proposals.

• *The National Network for Environmental Management Studies (NNEMS)* is a fellowship program that encourages college students to pursue professional environmental careers. The program provides students from over 150 participating universities with the opportunity to receive stipends for completing research projects. Each year, EPA program managers and scientists design new NNEMS research projects based on agency priorities. Out of a field of over 1,000 organizations, NNEMS was named "One of America's Top 100 Internships" in the *Princeton Review*.

• *The President's Environmental Youth Awards (PEYA)* Program recognizes youth across America for creating projects that demonstrate their outstanding commitment to the environment. All PEYA nominees receive certificates from EPA's 10 regional offices; one from each region becomes a national winner. The national winners are brought to Washington, DC, for an annual awards ceremony. (See article on page 20.)

• *The Tribal Lands Environmental Science Scholarship Program* provides college students with funding to pursue undergraduate and graduate degrees in the environmental sciences. EPA created this program to increase the number of Native Americans working at EPA and on reservations to improve the environmental protection of Indian lands. Over 50 students per year now receive scholarships.

• *Environmental Education Awards* are issued bi-annually by EPA to recognize outstanding career contributions to environmental education. Four award categories honor excellence in teaching, literature, natural-resource management, and film/broadcast media. Recent award recipients were: Howard Michaud for over 70 years of contributions to the field of environmental education; Bradley Dean for his book *Faith in a Seed;* Terry Daniel for development of "Green Scene," an environmental education kit for teachers and students focusing on forest ecology and wilderness issues; and Shirley Briggs for her book *Basic Guide to Pesticides*.

• *The National Environmental Education and Training Foundation (NEETF)* is a nonprofit organization that fosters partnerships between the public and private sectors to fund and develop environmental education programs and initiatives. Congress authorized NEETF in the same legislation as EPA's Environmental Education Division to create two organizations which complement each other in advancing environmental education nationally and internationally.

• *Youth Programs and Conferences* of various types have been developed through partnerships between EPA and other organizations. Examples of such projects include: development of an educational computer game, "Operation Watershed," in partnership with the National 4-H Council; development and implementation of the *Teaching Resources and Individual Leadership (T.R.A.I.L. Boss) Manual* with the national Boy Scouts of America; and cosponsoring a national environmental youth summit planned and organized entirely by youth.

(Berger is a program analyst with the Environmental Education Division of EPA's Office of Communications, Education, and Public Affairs, where she manages the Tribal Lands Scholarship Program.)

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Jim Johnson photo, EPA

EPA Administrator Browner shows sixth-grade science students how to filter water for a science project. This Earth Day event took place at Ross Elementary School, Washington, DC.

Twenty-five business schools have teamed up to teach future managers how to incorporate environmental protection into their day-to-day decisions.

Vice President Al Gore has launched a new program, called GLOBE, that links school children and scientists around the world to make measurements and observations of the environment.

Through grants, EPA is funding state and local programs that are bringing environmental education into the public-school classroom and to the adult public. Other programs are training teachers to teach about our environment. Still others bring environmental education to tribal lands.

A program in Brooklyn, New York, teaches children and adults to value and preserve the best in their urban environment.

The President's Environmental Youth Awards recognize outstanding environmental achievement by young people—such as the Georgia students who started a recycling center and reduced trash in the county landfill by 300,000 pounds.

Expanding information, expanding involvement: These are key to solving environmental problems. . . .

All of these fine efforts are educating Americans old and young, so that they can participate fully in protecting their family, their community, and their world. This vital work must continue and expand.

Two in five Americans still live in areas where the air is dangerous to breathe. Forty percent of our rivers and lakes are not suitable for drinking, fishing, or swimming. In Milwaukee in 1993, hundreds of thousands of people got sick from contaminated drinking water; 100 died. Asthma is on the rise. Breast cancer is on the rise. And we face complex global environmental problems.

Expanding information, expanding involvement: These are key to solving environmental problems—problems as small as the contamination of the local creek and problems as large as the ozone hole.

Working together—as educators, governments, businesses, and citizens—we can continue to deepen environmental understanding throughout this country and enable millions of Americans to participate in passing along a safe, healthy world to our children and our grandchildren. ❑

Preparing for the Next Century

Public understanding is critical

by Senator John H. Chafee

Discovering life at the shoreline. Environmental education leads to public support for environmental protection.

Mike Brisson photo: University of Wisconsin-Stevens Point. Copyrighted.

Last November's election sharpened profoundly the debate on environmental issues in Congress. Although protection of the environment was not a determining factor in the Republican takeover of Congress, the current anti-government, anti-regulation mood is directed more and more at the environment. Unfortunately, the attack is fueled in part by sometimes misleading anecdotes of duplicative and costly regulations required under various environmental laws, such as the Clean Air Act and the Endangered Species Act.

(Senator Chafee [R-Rhode Island] chairs the Senate Environment and Public Works Committee.)

Day after day, newspaper and television reports detail the burden of environmental regulation—requirements for safe drinking water, industrial clean-up and the preservation of wildlife habitat—with little mention of the great advantages of a safe and healthy environment. However, many of the complex and interrelated problems plaguing our environment cannot be explained adequately in a newspaper article or a two-minute segment on the evening news. As the vast majority of Americans receive no formal education or training on environmental issues, the media remain the major source of information and guidance.

Certainly, some environmental issues, such as cleanup of our nation's lakes and streams, are much easier to understand than others. So many of us live near bodies of water and benefit directly and tangibly from these resources. Citizens are outraged, and rightly so, by the dumping of chemicals and sewage into our recreational waterways. All across the country, people have become part of the public policy process demanding cleaner water.

Congress and state governments have responded by developing water-quality guidelines and providing funding for the construction of sewage treatment plants. Take the Clean Water Act—approved in 1972 by a Congress that was shocked when the Cuyahoga River in Cleveland

caught fire as a result of pollution. In that law, Congress set some very ambitious goals, including the elimination of all discharges into surface waters.

We have not attained zero pollution yet, but we have made tremendous strides. Some of our most polluted waters, like Lake Erie and the Potomac River, have made remarkable recoveries because of the public call for clean water. Narragansett Bay in my home State of Rhode Island is another illustration of what an informed public and, in turn, regulation and funding can do to preserve a precious water resource.

Not all environmental problems—nor their solutions—are as easy to understand and to solve as point-source pollution, however. How many people understand the devastation of the Earth's ozone layer by chemicals such as chlorofluorocarbons (CFCs)? Without the proper information or a scientific background, people understandably have difficulty grasping how a hole in the atmosphere, thousands of miles away, could affect their livelihoods. Yet, according to EPA, ozone depletion is one of the most serious environmental threats facing the planet.

Likewise, how many people understand the concepts of cost-benefit analysis and risk assessment so often talked about with respect to environmental laws? I would guess not many. And yet these concepts have been viewed as the guiding principles of the environmental reform movement and this Congress' "First 100 Days."

It is imperative that we prepare for the coming century through environmental education. We cannot hope to implement solutions to our environmental threats without the involvement of an educated and scientifically literate public. Only then will the political debate and direction of environmental policy focus on real risks and not anecdotes that make catchy news copy. Education is the key.

Environmental education will lead to the development of public understanding of, and support for, national and international efforts to protect our limited natural resources. The need for a broad, interdisciplinary approach to environmental education—both in formal settings such as school curricula and through less structured channels such as community involvement—has never been more urgent than it is today. As Congress races to complete action on the agendas of the "Second 100" and "Third 100" Days, our citizens need to be informed so that decisions are based on sound science, not sound bites.

Our nation makes a substantial investment, billions of dollars, in protecting human health and the environment. With that level of commitment, it is important that we do it right, and with the best tools available. Times have indeed changed. Until this century, humans have been virtually incapable of causing irreparable harm to the environment. We lived on a seemingly limitless expanse of land with plentiful water resources. If we overutilized a particular area, we could always move farther west and south. That time is no more. Even the most remote areas of our country are facing development. Over the past few years, we have become painfully aware of the tradeoffs between development and environmental protection. Coastal erosion, oil spills, and contamination of our drinking water supplies are no longer mere threats, but real world problems.

Citizens need to be informed so that decisions are based on sound science, not sound bites.

The most important tool we have to deal with these assaults on our environment is education. Already we have made progress. In 1990, I joined in authoring the National Environmental Education Act. This legislation was designed to increase public understanding of the natural environment, and to advance and develop environmental education and training. Administered by EPA, the Environmental Education Grants Program created by that law has educated students, individuals, and communities in all 50 states about air and water pollution, watershed and ecosystem protection, and a host of other pressing issues. The vast majority of grants is directed to local communities for grassroots projects where the need is greatest.

In Rhode Island, education grants have funded a university project to teach middle-school students about global climate change, an Audubon Society effort to teach seventh and eighth graders about the effects of pollution on Narragansett Bay, and a study by the Rhode Island Zoological Society to provide an international perspective on water conservation by monitoring ecosystems in Rhode Island and Colombia. The aim is clear: to bring environmental education into the classroom and the community. Environmental education and science are not only for the professional in the field or laboratory, but for all of us.

This kind of personal involvement in our environmental future is essential. The environmental-education-policy mission cannot be carried out by a few from the top down. It must come from the bottom up, through local communities, grade schools, high schools, and our colleges and universities. The best way to encourage environmental protection is to demonstrate how environmental degradation hurts each one of us. And that means education. This is our mission for the 21st century and beyond.

Over the years, our nation has enjoyed some impressive environmental successes, but there is much more to be done. And education is the key. We must make environmental education a part of our lives. If education is encouraged, citizens will understand and take on their role as stewards of this Earth. Together we will be in a position to get beyond the rhetoric and deal with the real threats facing our environment. The goal is worth it. We have only one planet to ride on—let's pass it on to future generations in better condition than we found it. ❑

The Environmental Education Advisory Council

by Arva Jackson

The outcome of the contest described by H.G. Wells as "a race between education and catastrophe" will be determined, in part, by our resourcefulness and creativity in educating the public on the interdependency of the environment and humanity. EPA established the National Environmental Education Advisory Council in November 1991, as mandated under the 1990 National Environmental Education Act to assist the Agency in realizing this goal. In recently appointing new members to serve on the council, EPA Administrator Carol Browner encouraged the council to play a strong role in helping EPA guide its environmental education program and stated her belief that "the Council's perspective will greatly enhance EPA's efforts to support the field."

Eleven citizens serve on the council. They hail from the heartland (Nebraska, Illinois, and Kansas), the coasts (Georgia, Maryland, Massachusetts, Maine, and Washington state), the desert (Arizona), the Great Lakes (Wisconsin), and the nation's capital. They are six women and five men; they include a teacher (and several former teachers); two university professors; representatives from several conservation, education, and environmental nonprofit organizations; state government representatives, including an extension forester; two businessmen; and myself, a "senior American" and retiree from the federal government, now serving as chair of the council.

The common thread that binds the members in their individual and collective interests is support for EPA's successful implementation of the act. Here are some perspectives from council members on why environmental education is a priority:

Judy Braus, Director of Environmental Education, World Wildlife Fund

"Environmental education is important because it helps people understand how their actions and choices affect the environment. I am involved in environmental education because I believe it will help create an informed and committed citizenry that understands the connection between a healthy environment and a quality life."

Richard Wilke, Associate Dean, College of Natural Resources, University of Wisconsin-Stevens Point

"Prevention is a better strategy than enforcement or remediation, and environmental education is the best approach to preventing environmental problems. I firmly believe that environmental education is our best hope of achieving a sustainable society and that there is no better way for me to contribute to the preservation of both environmental quality and our quality of life than by teaching about the importance of protecting the environment."

Peter Corcoran, Associate Professor and Chair of the Education Department, Bates College, Maine

"Environmental education is important because it provides the knowledge to make intelligent decisions, the values and skills to implement them, and, at its best, the hope that they will make a difference. I am involved in environmental education because it feeds the fire of my passion for the Earth."

Council Priorities

The current priorities of the council include:

- Developing a report to Congress which assesses the state of environmental education in this country. The report is expected to discuss why environmental education is critical, timely, and relevant, especially in light of current education reform efforts. It will provide recommendations to the field—to EPA and other federal agencies, states, schools, universities, and nonprofit organizations—on how to improve existing efforts. It will also suggest ways for EPA to strengthen its role in providing leadership for the field as envisioned by Congress in passing the act.

- Providing advice and recommendations on EPA's September 1995 award of a three-year cooperative agreement to a university or nonprofit organization to operate the National Environmental Education and Training Program.

- Providing advice and recommendations on EPA's annual Environmental Education Grants Program, which provides funds to support programs operated by states, schools and universities, and nonprofit organizations. The 1995 grant awards were announced this past spring.

- Helping EPA improve its communication, coordination, and information exchange with environmental and educational groups, and other sectors of society.

In addition to those named above, the following currently serve on the council:

Kristina Allen, Arizona Department of Education

Rodney Bates, Bates and Associates, Nebraska

Kathleen Blanchard, Quebec-Labrador Foundation, Massachusetts

Steve Hulbert, Hulbert Pontiac, Washington

Kathryn Fox May, Blue Ridge Elementary School, Georgia

Virginia Sue Smith, Keep America Beautiful, Illinois

John Strickler, Kansas State University/Kansas Department of Wildlife and Parks. ❑

(Jackson chairs EPA's Environmental Education Advisory Council. She is retired from the National Oceanic and Atmospheric Administration.)

Where Are the Gaps In Environmental Education?

Disadvantaged kids have different needs and concerns

by David B. Rockland

Readers of *EPA Journal* most likely place environmental protection high on a list of society's priorities. But what about a kid growing up in Anacostia or in the Bronx? Where violence, guns, and drugs are everyday concerns, do kids see the environment as comparably important? And how should environmental education programs be designed to reach disadvantaged children, who are most likely to be exposed to environmental risks, and not just middle-class kids?

Many of us with children have found that they are our environmental conscience. When my seven-year-old asks me to set up a recycling center at home, and my six-year-old berates me for not turning off the water when I brush my teeth, I know who the real environmental activists in the family are. But where do they get their environmental information? What motivates them? And as they grow older, will their environmental awareness have been a fad?

To find the answers to these questions, the National Environmental Education and Training Foundation (NEETF), with funding from EPA, conducted a national survey of students, grades 4-12, on their environmental concerns, education, and actions. The survey includes a special focus on disadvantaged youth (defined as students from neighborhoods where 30 percent or more of the population is at or below the poverty line).

Chartered by Congress in 1990, NEETF works to create a national and international environmentally literate citizenry and workforce; facilitate partnerships among federal, state, and local government, business, industry, academia, environmental groups, and international organizations; leverage public and private resources for environmental education, training, and research; and foster an environmentally conscious and committed public. As part of this mission, NEETF conducts research to identify critical gaps in environmental education to discern how the foundation, and others, might best focus available resources to fill gaps in environmental education.

To develop a better understanding of the level of environmental knowledge and behavior among today's youth, NEETF contracted Roper Starch Worldwide in 1994 to conduct a two-part national survey; the resulting report is called *Environmental Attitudes and Behaviors of American Students*.

Part One surveyed a representative cross-section of American students nationwide, grades 4-12. Part Two focused on students from disadvantaged areas. The survey used a school-based methodology to interview a nationally representative cross-section of 982 youth in 42 schools and 2,139 youth from disadvantaged areas in 91 schools. Interviewing for the cross-section was conducted between April 28 and May 31, 1994; interviewing for the sample of youth from disadvantaged areas was conducted between September 23 and October 24, 1994.

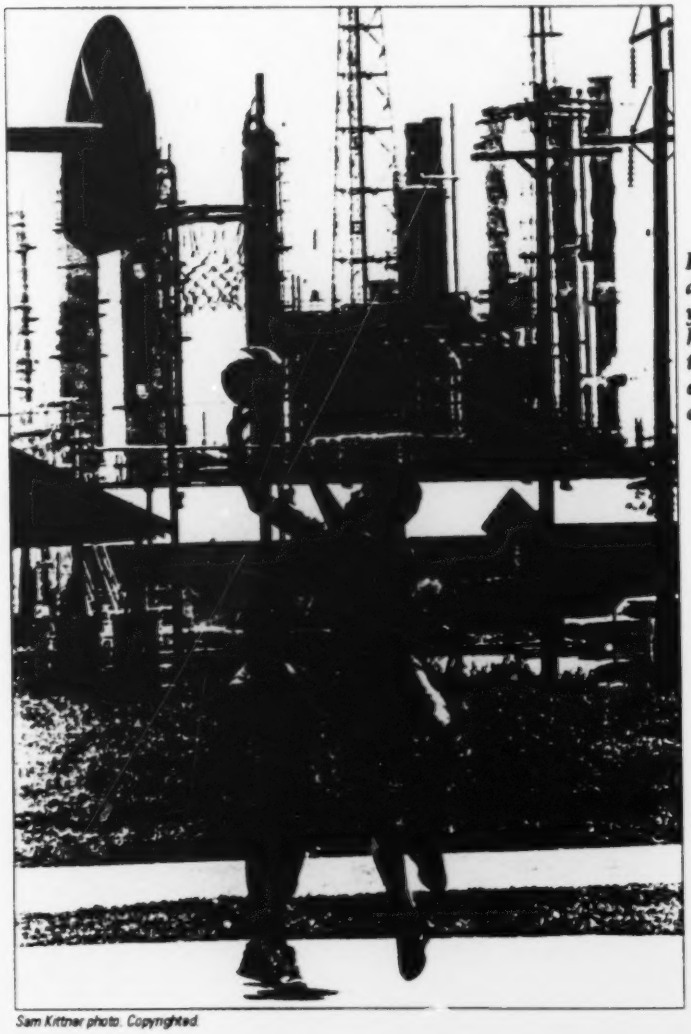
This was the first comprehensive survey on environmental views and educational needs to focus on disadvantaged youth. It is important to study students living in disadvantaged socioeconomic circumstances due to their higher exposure to environmental hazards; their often limited opportunities to experience nature; and the many other critical concerns in their lives relative to environmental issues. The results of this survey should open the gateway for the public and private sectors to join forces to fill the discernible gaps in environmental education, especially regarding disadvantaged youth.

Key results from the two surveys are summarized below:

All Students

- Among 10 critical issues affecting youth today, solving environmental problems is second, behind only AIDS, among things youth would personally like to make better.
- Seventy-four percent of the students said they learn about the environment from television, 50 percent from school, 31 percent from newspapers, and 28 percent from their families.
- Younger children (grades 4-5) report the highest levels of knowledge about the environment; they also give the highest ratings to the quality of environmental education they receive in school. There is a rapid decline in both ratings each year thereafter, with high school students reporting the least knowledge and the lowest quality of curricular environmental education.
- Girls are more likely than boys to worry about the environment.
- Protection of the rain forest and the consequences of the ozone hole are the top environmental issues of concern to American students; lead poisoning and energy shortages are rated at the bottom of the 19 issues listed.
- American youth and their families take environmental actions including saving energy (78 percent), recycling (69 percent), and saving water (67 percent). Those with a higher level of environmental knowledge and education in school also report higher levels of action.

(Dr. Rockland is President of the National Environmental Education and Training Foundation.)



For disadvantaged youth, their health is the main environmental concern.

Sam Kittner photo. Copyrighted.

• Recycling, air pollution, and littering are environmental issues that students say they know most about, whereas damage to the ozone layer, endangered species (animals, plants, and insects), and global warming are environmental issues they want to learn more about.

• The key to getting youth involved in environmental issues is getting them close to nature; 56 percent report this as their top choice for getting involved with environmental issues, compared to 27 percent for the second most selected choice, being rewarded with coupons redeemable for prizes.

Students from Disadvantaged Areas

• The environment ranks eighth among a list of 10 societal issues that students from disadvantaged areas want to make better; AIDS is number one, and the economy is number two.

• Despite the more pressing concerns in their lives, students from disadvantaged areas are as likely as all students to say they are interested in helping the environment.

• Students from disadvantaged areas ranked shortages of good drinking water, lead poisoning, acid rain, and energy shortages as issues of greater concern than did students from non-disadvantaged areas.

• Human health is by a wide margin the number one reason students from disadvantaged areas give for protecting the environment in general.

• Disadvantaged kids want to focus on solving immediate environmental problems, such as air-pollution sources or waste sites in their neighborhoods, to a far greater degree than do non-disadvantaged students.

• Students from disadvantaged areas place greater emphasis on a clean environment here and now than do non-disadvantaged students; the latter opt for a clean environment in the future and for protecting plants and animals.

Several significant implications for environmental education emerge from the survey. High-school environmental education, for example, appears to fall short. These students are about to become adults, and we need to make sure they are as well prepared as possible to deal with the environmental issues they will face.

Kids enjoy and learn well through experiential, hands-on techniques, and TV is clearly kids' top choice for getting environmental information. Although the fact that kids watch so much television is generally considered negative, this could be seen in a positive context. In the next few years, the TV, computer, and telephone could all become one instrument and the primary source of all household information. The environmental education world needs to keep the pending transition to multi-media information-and-entertainment sources in mind as we develop programs for the future.

The data clearly show that non-disadvantaged youth, as compared to their disadvantaged counterparts, have a more altruistic focus on environmental problems and are relatively more concerned about plants and animals, and about future generations. Youth from disadvantaged areas are more concerned about present and immediate environmental problems, most likely because they live with health-threatening problems day in and day out. However, all students agree that human health is the top reason to protect the environment.

Environmental Attitudes and Behaviors of American Youth is the first comprehensive survey on environmental views and educational needs with a focus on disadvantaged youth. As the public and private sectors join forces to develop programs and to set goals, standards, and expectations for environmental education, NEETF will continue to explore key questions.

To find out how you can receive a copy of the survey, call NEETF at 202 628-8200. ❑

GLOBE Partnership Launched

by Thomas N. Pyke, Jr.

Kids and scientists are collaborating worldwide

Imagine a program that:

- Boosts worldwide scientific understanding of the Earth.
- Spurs environmental awareness of people everywhere.
- Raises students' achievement in science and mathematics.

An extraordinary new program called GLOBE—Global Learning and Observation to Benefit the Environment—is pursuing all three of these goals in a real-world framework. The program works through partnerships, effectively joining together the minds and hands of thousands of young people, school teachers, scientists, and others around the world.

GLOBE was launched on Earth Day 1995. Charter participants included students in hundreds of schools around the United States and in other nations, all ready to begin making *scientifically sound* measurements and observations of their environment and to share the resulting data by using state-of-the-art communications systems. That was just the kick-off. Almost 2,000 schools have signed up to take part in the program, and we expect the numbers to keep growing.

To see how GLOBE works, consider some representative scenes:

A group of 10-year-olds gathers outside their grade school early in the morning to measure air temperature and precipitation, and to record the amount and type of cloud cover.

At the same time in another state, some high schoolers carefully record the amount of moisture in the soil at three different levels below the surface. They discuss their findings with their teacher and punch data into a computer.

Later that day, some junior high students in still another part of the country use their computer's Internet "electronic highway" hookup to transmit information on the acidity of local rainwater to a science-data-collection center.

Meanwhile, students on other continents carry out identical work and study. This is not busywork: They are student-scientists gathering technically sound measurements that they—and well-known scientists—will use to learn more about our planet.

At the data center, scientists and technicians combine the information from the many GLOBE schools with that received from other sources, such as satellite-carried instruments. Together, those data help form global pictures of various Earth environmental conditions such as temperature and soil moisture levels.

The next day, students at GLOBE schools flip on their computers and see what the data center has returned: visualizations in vibrant color and clear design depicting the knowledge the students helped gain about the world.

The students may first choose to examine atmospheric measurements and then, with a touch, switch to biomass readings. They consider the findings: What do the patterns say about global conditions? How do their local data compare to global data? They discuss these issues with their teachers, who are trained in GLOBE's science-education technical program.

With another touch, students shift from the global to a regional view of various findings. Where else in the country—where else in the world—are there data like their own? They communicate directly with some schools in their state and a school on another continent, discussing their findings. They also check their own files on local and global measurements to see how the new data compare to last month's.

Back at the GLOBE science center, the data collected by students are prepared for use by scientists who need data gathered from far-flung places. The

Students record daily maximum and minimum temperatures taken by special thermometers. Shelter reduces influence of sunlight.

Steve Delaney photo, EPA

(Pyke is Director of the GLOBE program.)

Steve Delaney photo, EPA

Students participating in GLOBE consider data gathered by their counterparts from around the world.

scientists' deductions from studies using GLOBE and other data will be shared with the world at large, increasing our collective understanding of the Earth.

Starting Up

The vision for GLOBE was first expressed by Vice President Al Gore. The program has been planned and implemented by a U.S. government interagency team. Participating agencies include the National Oceanographic and Atmospheric Administration (NOAA), the National Aeronautic and Space Administration (NASA), the Departments of State and Education, the National Science Foundation, and EPA. Following are some highlights of the startup phase of the program:

- Over 100 nations have expressed interest in GLOBE. As of this writing, the United States has signed bilateral agreements with more than 20 countries. Each participating country will operate the program within its own borders.
- GLOBE conferred early on with leaders of successful environmental education projects and programs to enlist their advice and their involvement in this new worldwide system.
- GLOBE worked with prestigious scientists from various disciplines to determine what data would best serve the needs of science, and with leading educators to decide what would best enhance students' learning.
- GLOBE brought educators and scientists together to determine what knowledge and training would be needed by teachers and students to enable them to conduct the work; what data such students can accurately obtain; and what kinds of conceptual and analytical skills students will be building through their participation.
- GLOBE involved top-notch systems analysts and computer-visualization specialists for Internet and school computer support, to process GLOBE data, and to develop pictorial information that is informative, understandable, and attractive to youngsters of various ages.
- GLOBE education teams have held training sessions around the country to show teachers how to institute the program, supervise the gathering and transmission of data, and analyze the results with the students.
- Several hundred schools won limited federal assistance in securing computers and scientific measuring instruments and helping teachers attend GLOBE training workshops.

Growing and Growing

With GLOBE's startup underway, scientist-educator teams are working to enhance the scientific and educational content of the program—and to reach out to thousands of schools. As the program grows, more schools will be looking for assistance. To help on this front, a nongovernment partner is being selected to coordinate the gathering of financial support from the private sector.

Even schools that cannot yet conduct GLOBE measurements can benefit from the program by using the Internet to receive GLOBE data, on-screen global visualizations based on those data, and on-line educational material. Anyone with access to the Internet will be able to "look in" and learn. Also, as GLOBE expands, its data and imagery may be publicly disseminated by news and weather organizations and through various scientific, educational, and governmental information systems.

Given the reception GLOBE has received in the United States and around the world, I am confident the program will grow rapidly in the coming years and contribute on a large scale to the environmental awareness of many millions of people and an improved scientific understanding of our planet. ❑

GLOBE Measurements

Atmosphere/Climate
- Air temperatures
- Precipitation levels
- Cloud cover

Hydrology/Water Chemistry
- Water temperature and pH
- Soil moisture

Biology/Geology
- Biometrics
- Species identification
- Land cover
- Phenology (seasonal change)

Note: Additional measurements to be added in the future

For further information contact:
GLOBE
744 Jackson Place, NW.
Washington, DC 20503
Phone: 202 395-6500
Fax: 202 395-7611

A GLOBE overview on the Internet is at:
http://www.globe.gov/

The E-mail address is: info@globe.gov

Eco-Ed Grows in Brooklyn

by David Lutz

Education can build sustainable urban communities

Whether bringing children to a park pond to discover tadpoles or teaching them about the strength and structure of the Brooklyn Bridge by suspending ropes from their shoulders, the Brooklyn Center for the Urban Environment (BCUE) is not a traditional environmental education organization. The center was founded in 1978 by Brooklyn's own John Muir, who sees the city as an intricate and positive part of the environment. Consistent with that vision, he has structured a program that encourages young people to appreciate the city's built and designed aspects, as well as study and care for the islands of green space that help lend harmony to the built environment. Thus, a day spent with BCUE is as likely to include searching for animals carved in stone as for insects under rotting logs in Brooklyn's Prospect Park.

Mr. Muir never shared the antipathy for things urban displayed by his 19th century relative and namesake. Nevertheless, he came gradually to his commitment to teaching others about the riches of urban life. A former university teacher, Muir joined the staff of a large Staten Island park and nature preserve in the 1970s. "I learned that people had a high perception of crowdedness and dirt in the city—and a low perception of the amenities of an urban environment," he recounts. "I realized that I had been unwittingly contributing to these anti-urban attitudes. We used to get bus loads of kids from inner city neighborhoods and often they would leave our park with the attitude that the forest was good and their neighborhood back home was bad. It was not the kind of message that contributes to self-esteem or a sense of stewardship and responsibility."

When BCUE started in 1978, Muir and his staff tried to get people to look at elements of the built environment the same way they look at the natural environment. "Buildings really are as diverse and classifiable as trees," he says. "There are natural processes taking place on buildings; the stones weather like boulders, contain visible fossils, and have been placed here from all over the world."

Looking at the urban environment in this way brings surprising discoveries. For example, Bedford-Stuyvesant, widely perceived as an enormous slum, is in many ways among the finest urban neighborhoods in the country. It contains a large stock of sturdy and elegant 19th century row houses on tree-lined blocks. It has an effective and energy-efficient infrastructure. The urban disinvestment of the 1960s, reported nationwide in the pictures of burning buildings and confirmed in the abandonment of whole neighborhoods by the middle class, has resulted in significant amounts of new open space that are being re-cycled into community gardens, ball fields, and even re-naturalized spaces. In Bedford-Stuyvesant and elsewhere, preservation and planning build community and empower local people to resolve neighborhood problems. As John Muir says, "There will be a future when this kind of [urban community] space is valued above today's unsustainable suburban sprawl. And we are training the environmentalists of the future to help sustain our urban environments."

The not-for-profit BCUE accomplishes this ambitious mission with a daily program of classes for students ranging from kindergarten through 12th-grade levels, after-school programs, adults' and children's tours, an urban environmental science summer camp, and exhibits on the urban environment at BCUE's headquarters in the Tennis House in Prospect Park.

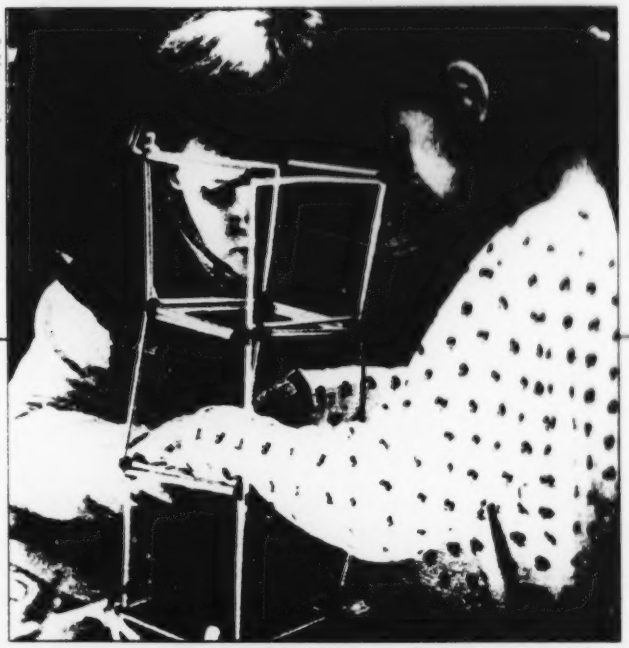
Currently on exhibit are photographer Brian Rose's pictures of Prospect Park, including sections that will be closed to the public during the major landscape restoration project that is about to begin. [See story on page 40.] Over 100,000 school children have experienced one or more of BCUE's programs, and many more have been influenced by the organization's efforts to pass environmental education skills on to the city's teachers through teaching seminars and courses. A weekly program of walks and tours for adults, encompassing natural, historic, and built elements of Brooklyn, is publicized through the organization's newsletter, *CityGreen*, and attracts both residents and visitors to the borough. Recent tours have included such off-beat explorations as neighborhood noshing (snacking) tours, tunnel tours, and boat tours. Also offered are inside looks at Brooklyn's environmental attractions such as the Coney Island Aquarium and tours of the "renaturalizing" parts of Brooklyn, such as Gateway National Recreation Area, among the most biologically diverse places in North America. (A free copy of the newsletter is sent to all who write for one.)

This spring, BCUE celebrated the newly completed renovation of its Prospect Park headquarters with a series of parties and events. The Tennis House is a 1910 classical revival Palladian-style building with an arched court open to the air. The structure sits on a short bluff above a meadow in the park that was designed by Frederick Law Olmsted in the 1860s, following his work on Central Park; Prospect Park has long been considered his masterpiece.

Mr. Olmsted was as ambivalent about the placement of this kind of structure in his parks as many environmentalists are about the growth of cities on the green planet. The irony of this is not lost on the contemporary Muir, who instills in his staff a working knowledge that playing out our nation's "house-and-land"

(Lutz is program director of Neighborhood Open Space Coalition, a New York-based advocacy organization. A lifelong urban environmentalist, he was among the original volunteers who started South Street Seaport, an architectural and maritime preservation project in lower Manhattan. He is the principal designer of New York's Metropolitan Greenways System, a 350-mile system of multimodal trails being built with Federal Intermodal Surface Transportation Efficiency Act funds.)

philosophy in the contemporary world will destroy what our nation has for so long prized. If we continue to ring our cities with newer and bigger developments of unattached houses, shopping strips, and malls, increasing amounts of formerly rural landscape will be changed into environmentally inefficient miniature "estates." ❑



BCUE photo. Copyrighted.

Building the Eiffel Tower in Brooklyn. At the Brooklyn Center for the Urban Environment, fourth-grade students in the Arches and Bridges Program learn some important engineering principles.

Paul Sheridan photo. Copyrighted.

Sixth and seventh graders are a little frightened as they enter America's first urban railroad tunnel, built in 1844.

A Subterranean Excursion

On a BCUE field trip to an abandoned railroad tunnel, 20 sixth and seventh graders climbed down the cold metal ladder into the manhole in the center of a busy Brooklyn avenue. About six feet below the street, they followed a narrow passage until they reached a hole in the wall. On the other side of the hole was an apparently large arched chamber with a 15-foot staircase down to solid ground. The world below was dark, damp—and warmer than expected.

The children were noisy and a little frightened as they entered America's first urban railroad tunnel, the precursor to the subway, built in 1844 and only recently rediscovered. They also got quite dirty. Below ground, the children learned about the living ecology of the lost tunnel: the fungus that grows on the walls, the absence of rats (no running water), the spider webs on the roof that capture moisture and create a sparkling display when flashlights are shined on them, and of course, the "ghosts" believed to inhabit the space. A ritual moment of silence in total darkness followed the ghost stories.

Preparation and follow-up for the trip were more practical. These included a participatory demonstration on how a catenary arch is built, information about other arch forms, insight into the careers of architecture, engineering, and construction, a history of railroads, ferries, and trolleys, and a "city planning" exercise in which the young people planned trolley lines to their schools and learned some principles of transportation planning. Toward the end of the program, the young people were asked if they would like to volunteer to help with the job of excavating the tunnel. About two-thirds of them said they would. This may lead to a summer camp program doing an archeological dig in the tunnel where a steam locomotive is thought to be buried.

Problem-Solving in Las Vegas

by Gregory Budd and Don Curry

Students are building skills and a global network

With assistance from EPA, students at Silverado High School in Las Vegas, Nevada, are learning first-hand about the collection, analysis, and interpretation of scientific data. The project started when one of us—science teacher Don Curry—received a grant to assist students in using telecommunications to collect information about the environment.

Initially, the students selected a portion of the Flamingo Wash, which runs west to east across Las Vegas, to monitor the water for dissolved oxygen, carbon dioxide, nitrates, phosphates, pH, and temperature. To reach this stretch of the wash, the students had to travel over a busy city street, and this made them aware of the number of vehicles in the area, the noise they created, and the malodorous exhaust that fumigated passers-by. Consequently, the students added air quality to their concerns and decided to take measurements of carbon dioxide, carbon monoxide, and ozone. Some students also became interested in radon.

At this point Curry sought help from EPA's Radiation and Indoor Air Laboratory in Las Vegas, and our collaboration began. We agreed that the lab would train the students in radon-analysis procedures and supply charcoal canisters for taking measurements. The canisters could be used to measure radon levels at schools in other states as well as at local schools.

Meanwhile, the students exchanged their water-quality data for data from their peers in other states via the Internet. As messages flowed back and forth between Las Vegas and such places as Texas, Georgia, Massachusetts, Hawaii, and Alaska, students gained insight into issues other than water quality. Messages contained information about school dress codes, sports, movies, and music. Connections increased to include schools in Russia, Poland, the Czech Republic, Italy, Africa, Australia, and the Ukraine. The students enlightened each other on social conditions, family life, homework, entertainment, weather conditions, and dating customs.

Education took on a new meaning for the students when they learned that many things taken for granted in the United States are considered luxuries in other countries. They became intrigued by comparisons of all kinds. Some of their peers had to wear uniforms to school; one group attended classes in a building constructed 180 years ago—decades before Nevada became a U.S. possession. In one European school there was no telephone. The teacher had to use a phone in a community office to send and receive e-mail messages. Perhaps the biggest surprise was that students in other countries could communicate in English.

Excitement grew as students used their PC and modem to extend invitations to other schools to join their radon assessment "network." They scheduled library time to study the health effects of radon and locations where radon levels were especially high. Most of the students were enrolled in foreign language courses, and they were encouraged to use their budding linguistic skills to communicate in the native languages of other countries. Teachers in the Silverado High School foreign language department helped them compose e-mail messages, and instructors in the English

Silverado High School students analyze radon charcoal canisters at EPA's laboratory in Las Vegas.

D. Gardner photo.

(Budd is a health physicist with EPA's Office of Radiation and Indoor Air Laboratory in Las Vegas. Curry teaches chemistry, biology, and marine science at Silverado High School. Graduating senior Mark Kelleher [University of Nevada, Las Vegas] also assisted with this article.)

department assisted them in structuring their written reports. Math instructors guided them in preparing graphs of their data. When the end of the school year brought work to a temporary halt, the project had become truly cross-curricular.

At the EPA lab that summer, the students received a one-week training session in the nature and extent of the radon problem, and that was followed by a "hands-on" laboratory period to instruct them in the use of instruments and equipment. Additionally, they were required to complete a radiation-safety class.

For the next school year, EPA's National Network for Environmental Management Studies (NNEMS) provided a fellowship for someone to coordinate activities between the Agency and the school. NNEMS is a federal environmental fellowship program designed to give university students the opportunity to work with environmental professionals and encourage them to pursue careers in environmental protection fields. Mark Kelleher, a senior pursuing an environmental studies major at the University of Nevada, Las Vegas, was chosen to fill this part-time position; his initial responsibilities included assisting students with the distribution of radon test canisters, assisting them with radon analysis at the EPA laboratory, and trouble-shooting telecommunication problems.

By October, radon assessment activities were in full swing. The Las Vegas students were working with schools in Texas, California, Florida, Vermont, Georgia, Montana, and Pennsylvania, as well as other schools in Nevada. Radon-testing canisters were shipped to the individual schools, exposed for a seven-day period, and returned by express mail to the EPA lab. A specialist at the lab assisted students in analyzing the canisters and interpreting the data. The students reported the results back to the other schools.

As a result of their efforts, by mid-December Curry and his students were invited to make a presentation about the radon project at a National Science Teachers' Association Conference being held in Las Vegas. More than 3,800 science teachers from throughout the United States and from foreign countries participated. The students handled the bulk of the presentation, which was well-attended. A number of participants remained after the session to discuss radon assessment with individual students. In the weeks following, e-mail messages from science teachers around the world requested additional information or asked to be included in the network of radon-project schools. The Silverado students were elated to have their work recognized by "science people."

Then, an unanticipated problem surfaced. The students, eager to expand their program to include schools throughout the world, discovered they couldn't use the charcoal canisters overseas. Radon absorbed by the charcoal in the canisters decays over a relatively short period of time. The time between exposure and analysis is critical. Project schools in the United States were sending back canisters via express mail immediately upon completion of exposures. They arrived at the EPA lab within 24 hours and were analyzed immediately. Mail from Europe, on the other hand, often takes two weeks or more to arrive in Las Vegas. As a remedy, the lab is considering a radon-measurement method that uses ionization chamber technology and is not subject to the time constraints of the charcoal method.

What does the future hold for this project? There is potential for increased collaboration between the students and EPA scientists on air-quality and other environmental issues. Nearly every day, local news articles detail controversies over water use as Las Vegas continues to be one of the fastest growing cities in the United States. Earlier this spring, the county court house had to be evacuated because employees and citizens became mysteriously ill as a result of "something in the air." For its part, EPA's Las Vegas laboratory is actively involved in the investigation of other indoor air pollutants besides radon and would like the students to expand the project to include them as well. ❑

EPA health physicist Gregory Budd (standing) and University of Nevada senior Mark Kelleher work with a database that stores student data on radon content.

D. Gardner photo

The President's Environmental Youth Awards Program

Young people show the way in their communities

by Doris Gillispie and Catharina Japikse

Young people from every state participate annually in the President's Environmental Youth Awards (PEYA) program. This nationwide program is designed to encourage individuals, school classes, summer camps, public interest groups, and youth organizations to promote environmental awareness and community involvement. EPA and the White House Office of Education began the program in 1971.

Students compete at two goals: the regional certificate program and the national awards competition. Regional certificates with the President's signature are awarded to each participant by the EPA regional offices. National individual project winners, or one representative from a national award-winning group project, along with one project sponsor, receive an expense-paid trip to Washington, DC, where they are honored at a national awards ceremony.

In 1994, over 18,500 projects were submitted, from which the 10 regional winners were selected.

1994 Winners

In Maine, 18 fifth-graders formed the Zippel Energy Group to raise community awareness of environmental concerns. They organized a patrol to monitor the conservation habits of their teachers, families, and friends and encouraged them to reduce, reuse, and recycle. They wrote letters to their elected officials expressing their environmental concerns. They energized their local community through presentations to civic groups and displays in businesses, and organized environmental fundraising activities to benefit their favorite charities.

Josh Mele and other members of Fayetteville, New York, Boy Scout Troop 152 planned and constructed a stream improvement project to provide a new habitat for stream trout at the Carpenter's Brook Fish Hatchery. The highlight of their project was a pool digger: a log dam with a section of the top cut out to form a waterfall. The churning action of the falling water created a basin with enough depth, food, and shelter to support trout living in the stream. Mele and his troop also received the Governor's Citation Award and the Onondaga County Parks' Award of Excellence.

Heather Sprague, an 11th-grade student from Hockessin, Delaware, organized an "all kids" Delaware State Environmental Conference. High school

Camillus, New York, Advocate photo. Copyrighted.

(Gillispie is Coordinator of Youth Programs with the Environmental Education Division of EPA's Office of Communications, Education, and Public Affairs. Japikse is Assistant Editor of EPA Journal.)

Region 4 photo EPA

Student members of Future Farmers of America set up the first recycling center in Morgan County, Georgia.

students throughout the state learned how to begin their own environmental clubs and discovered types of environmental projects their clubs could adopt. Invited exhibitors, speakers, and group leaders shared information and answered questions about environmental careers. The "all kids" conference inspired many students to start environmental clubs and new projects. After the conference, Sprague distributed a directory and statewide newsletter.

Student members of the Future Farmers of America planned, constructed, and organized the first recycling center in Morgan County, Georgia. In its first year, the center reduced the amount of trash hauled to the county landfill by over 300,000 pounds. Proceeds from the center paid for the construction and maintainance of an outdoor environmental study area and classroom. This area was built by club members and contains a three-acre "wildlife habitat" around a one-acre pond. The students served on city and county recycling committees, and they introduced local proclamations and a bill in the state legislature in support of recycling and other environmental concerns.

Josh Mele stands by "pool digger" that creates new habitat for stream trout. He and other members of Boy Scout Troop 152, Fayetteville, NY, won Region 2 award.

Jason Spanel, a 15-year-old Eagle Scout from Eldorado, Illinois, created a 3.1-acre wetland in partnership with private, corporate, and government agencies. He designed the wetland using a computer-aided design system to map the location for trees and moist plants. He organized his fellow scouts to plant the 250 trees, 88 shrubs, and 300 moist plants donated by local nurseries. After the wetland was established, he contacted an architect to help design and build a boardwalk with interpretive signs through the wetlands to educate visitors about the importance of restoring and protecting wetlands.

Eighteen third-graders at Becker Elementary School in Austin, Texas, formed the "Junior/Senior Alliance for the Environment." Senior citizens and other community members joined with the students in constructing an aquaculture pond in the school garden, conducting water-quality testing in a nearby creek, making litter bags, landscaping a "Green Habitat for Humanity" house, and sharing their knowledge of gardening with deaf and blind students. In addition to the environmental improvements, students with special needs in math and science earned confidence in their abilities, and the senior citizens gained increased self-respect and new focus in their lives.

Kids Involved in Community Kleanup (KICK) is a group of sixth-graders from Aurora Middle School in Aurora, Nebraska. The students set out to educate and improve their community through a variety of environmental projects. They worked closely with city officials and the county extension office to develop project ideas. For example, after the town landfill banned yard waste, KICK hosted a workshop for Aurora residents to demonstrate better disposal techniques. Other activities included: a paper recycling program at their school; designing booths and presentations for several conferences and fairs; and a video presentation for the local PBS station.

Every teacher and student at Hygiene Elementary School in Hygiene, Colorado, participated in Project SOS (Save Our Species), a year-long study of wildlife and global habitats focusing on endangered species. The cross-curricular study emphasized research, hands-on activities, and problem-solving initiatives. It culminated in a community environment festival, which included student research projects, environmental artwork, posters, murals, and displays.

Region 10 photo: EPA

Homemade mudwalking shoes prove useful to this student surveyor on tidal flats of lower Columbia River. Mapping program to improve salmon habitat won Region 10 award.

Invited experts and many of the students gave presentations. Most of the community, including state representatives and the Superintendent of Schools, attended.

As a community-service project to earn their Silver Award, six members of Girl Scout Cadette Troop 460 restored a portion of Hawaii's Kanaha Pond wildlife sanctuary, used by both native and migratory waterfowl. The pond had become overgrown and had been used as a dump. The scouts cut a 10-foot-wide path through invasive non-native brush to the pond. Around the pond's perimeter, they removed about 20 tons of cuttings and trash and reintroduced native grasses and plants. As a result, native waterfowl have returned to the pond. Three other youth groups have since joined them in restoring more of this wildlife habitat.

Oregon students at the Coastal Studies and Technology Center at Seaside High School worked with research scientists, community members, and government agencies to develop their science skills while carrying out environmental projects. Students from Seaside and other area high schools collected and identified benthic and invertebrate samples from Trestle Bay and used a computer-mapping program to generate maps of the lower Columbia River that are being studied for salmon habitat restoration by local agencies. Together, the students and agencies will identify a segment of a jetty to be removed; this will allow tidal influences to return to the bay and improve salmon habitats.

How to Enter

Interested individuals or groups in grades K-12 may obtain application materials and contest rules by contacting the appropriate EPA regional office (see box). The regional certificate program is conducted year-round; therefore, applications can be submitted at any time. To be eligible for the national award competition, applications must be postmarked on or before July 31 of the award year. Contact your EPA regional office for a PEYA brochure/application which contains additional information. ❑

Environmental Education Regional Contacts

Region 1
CT, MA, ME, NH, RI, VT
USEPA Region 1 (REA)
Office of External Programs
JFK Federal Building
Boston, MA 02003
Phone: 617 565-3574

Region 2
NJ, NY, PR, VI
USEPA Region 2 (2EPD)
External Programs Division
290 Broadway
26th Floor
New York, NY 10007-1866
Phone: 212 637-3678

Region 3
DE, MD, PA, VA, WV, DC
USEPA Region 3 (3EA20)
841 Chestnut Street
Philadelphia, PA 19107
Phone: 215 597-6685

Region 4
AL, FL, GA, KY, MS, NC, SC, TN
USEPA Region 4
Office of Public Affairs
345 Courtland Street, NE
Atlanta, GA 30365
Phone: 404 347-3004

Region 5
IL, IN, MI, MN, OH, WI
USEPA Region 5 (P-19J)
77 West Jackson Boulevard
Chicago, IL 60604
Phone: 312 886-0995

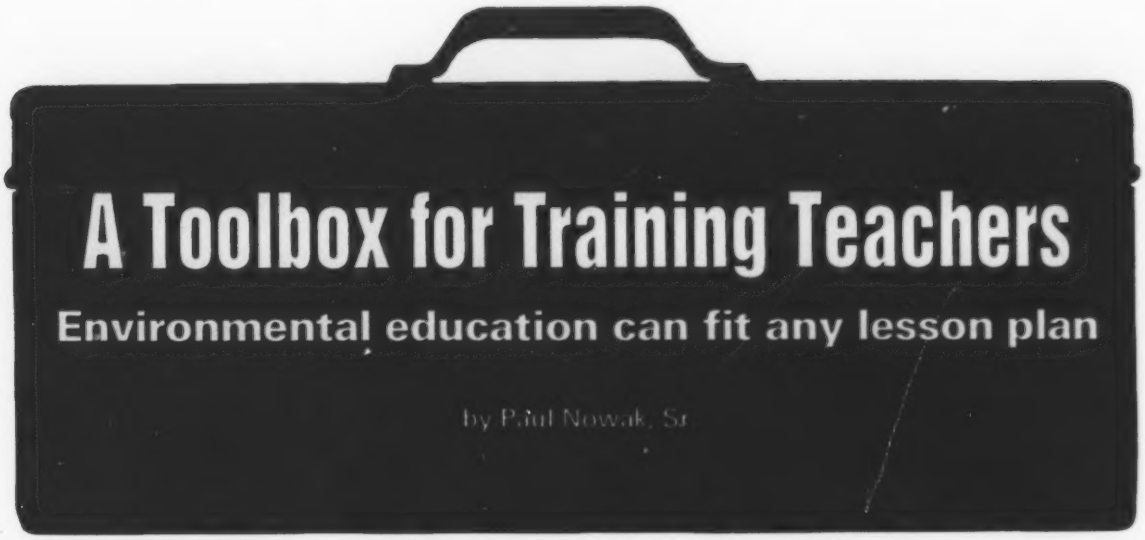
Region 6
AR, LA, NM, OK, TX
USEPA Region 6 (6X)
Office of External Affairs
1445 Ross Avenue
Dallas, TX 75202-2733
Phone: 214 665-2204

Region 7
IA, KS, MO, NE
USEPA Region 7
726 Minnesota Avenue
Kansas City, KS 66101
Phone: 913 551-7003

Region 8
CO, MT, ND, SD, UT, WY
USEPA Region 8
Office of External Affairs
999 18th Street, Suite 500
Denver, CO 80202-2466
Phone: 303 294-1113

Region 9
AZ, CA, HI, NV, AS, GU, TT
USEPA Region 9 (E2)
75 Hawthorne Street
San Francisco, CA 94105
Phone: 415 744-1581

Region 10
AK, ID, OR, WA
USEPA Region 10 (SO-141)
1200 6th Avenue
Seattle, WA 98101
Phone: 206 553-1207
or 1-800-424-4EPA



A Toolbox for Training Teachers

Environmental education can fit any lesson plan

by Paul Nowak, Sr.

The 1990 National Environmental Education Act provides federal funding for preparing educators to teach about the environment. Since its inception in 1992, the National Consortium for Environmental Education and Training (NCEET) has been awarded EPA funds to help teachers make environmental education (EE) an integral part of their instruction.

During its first year of funding, NCEET sought others' input to identify approaches which would be the most helpful to teachers. We conducted focus groups and interviews, convened roundtable discussions, and developed and distributed surveys to gain input from environmental educators, mainstream educators, resource professionals, and students.

Those surveyed suggested that existing training programs provided good avenues for teachers seeking new materials, but that teachers often had difficulty finding materials that fit the local setting and that addressed student interests. Teachers also sometimes doubted their own ability to cover environmental education materials adequately. Finally, our outreach efforts suggested that approaches and materials beyond those traditionally used in environmental education might be particularly useful in meeting the environmental interests of teachers and students in urban settings.

In response, NCEET developed some materials that would be directly useful to teachers and local resource specialists: *Getting Started*, a teachers' manual; and EE-Link, an online information resource (Gopher/World Wide Web sites on the Internet). Further, NCEET developed other components of what came to be known as the EE Toolbox in collaboration with dozens of experienced practitioners and noted experts in environmental education and complementary fields (see box on next page). The EE Toolbox and EE-Link are now the major focus of our programs.

The EE Toolbox materials are resources in the workshops that NCEET and various in-service providers conduct for teachers and teacher trainers. In arranging these workshops, we typically collaborate with existing state and national organizations that teachers already recognize as avenues for enhancing teaching skills. NCEET has conducted training workshops with participants from more than two dozen states and has distributed over 10,000 copies of *Getting Started* and other EE Toolbox publications to teachers and teacher trainers throughout the country. NCEET's electronic network, EE-Link, has been accessed by tens of thousands of users since its introduction in September 1993; it currently serves over a thousand users daily.

NCEET continues to explore areas in urgent need of creative solutions. Specifically, we are currently supporting urban, multicultural, and Native American initiatives. The findings indicate that these audiences have been traditionally under-served by environmental education, in part because of their atypical educational needs and circumstances. During its final year of funding under the current three-year grant, NCEET has sponsored national gatherings and working groups, has conducted focus groups and surveys, and is compiling information on a variety of successful programs in an effort to better understand and serve these audiences.

For more information on EE Toolbox components and workshops or on EE-Link, or to receive a free catalog, please call NCEET at 313 998-6726, or write to NCEET, University of Michigan School of Natural Resources and Environment, 430 East University Avenue, Ann Arbor, Michigan 48109-1115. Contact nceet-info@nceet.snre.umich.edu to receive information by e-mail. ❑

(Dr. Nowak is Director of NCEET at the University of Michigan.)

EE Toolbox

The **Workshop Resource Manual** consists of eight units, all written specifically for people who plan and conduct in-service workshops about environmental education.

• *Designing Effective Workshops:* It helps to have an important and relevant topic, but the success of a workshop depends considerably on how its message is delivered. This unit is a how-to guide for facilitators, with techniques for guiding discussions, leading role-plays and field trips, and giving interactive lectures. Program planning ideas cover needs assessment, workshop design, evaluation, and follow-up.

• *Defining Environmental Education:* Understanding the accepted purposes and goals of environmental education helps explain the value it offers to both the educational and environmental communities. Ten workshop activities suggest interactive strategies for exploring the essence of environmental education.

• *Integrating Environmental Education into the School Curriculum:* Environmental education in-service programs are more successful when they help teachers understand that environmental education can enhance their curricular objectives without adding extra lessons. This unit offers three different workshop strategies along with tips and examples. Ten activities demonstrate how environmental education can help teachers achieve their content and learning-process objectives.

• *Approaching Environmental Issues in the Classroom:* Addressing issues, even controversial ones, is essential for environmental-education programs that prepare learners to solve environmental problems. This unit explains the choices teachers have for approaching environmental issues. It includes tips on how to organize workshops and activities that illustrate different approaches and help build teachers' skills in handling issues with their students.

• *Urban Environmental Education:* Understanding the ecology of the urban community, becoming knowledgeable about urban environmental issues, and building the skills to engage learners in resolving those issues are important elements of urban environmental education. The guidelines, examples, case studies, and workshop activities in this unit will help facilitators plan and conduct environmental education workshops in urban areas.

• *Using Community Resources:* Schools are not isolated institutions, but interactive elements of their communities. This unit describes how people, agencies, and institutions in the community can enhance environmental education. It lists specific guidelines for working with community resources through field trips and in-class projects, and describes techniques for helping teachers discover community resources.

• *Computer-Aided Environmental Education:* Technological advances should not leave environmental education teachers in the woods! This unit offers an overview of the opportunities (and pitfalls) that computers offer to environmental educators. Among the topics covered are instructional software, interactive networks, and Internet resources.

• *Evaluating Instructional Resources:* Teachers may be overwhelmed with the number of instructional resources that beg for their attention. This unit describes several alternatives for evaluating these materials.

The EE Reference Collection is a compilation of reprinted articles that complements the Workshop Resource Manual. The articles are authored by leaders in the fields of education and environmental education, and cover environmental literacy, pedagogy, and conflicting perceptions of environmental education.

The Slide Resource Kit is an audiovisual tool for teacher educators, natural resource management professionals, and environmental educators. The slides and accompanying script describe the key ideas of environmental education, offer diverse examples, and make clear connections to the goals of education reform. The kit includes a synchronized audio tape as well as suggestions for using the slides in customized presentations.

The National Survey of EE Teacher In-service Education summarizes NCEET's findings from interviews with state environmental education coordinators. It includes recommendations for improving and expanding environmental education staff development at all levels.

Getting Started: A Guide to Bringing Environmental Education Into Your Classroom contains detailed information for teachers interested in initiating environmental education efforts in their classrooms. It includes stories about real teachers, written to inspire, motivate, and provide concrete ideas on how to proceed.

EE-Link is an online source of information about environmental education. EE-Link provides access to teaching resources on the Internet, including articles, databases, grant information, and instructional materials. To access EE-Link's gopher server, connect to nceet.snre.umich.edu. To access EE-Link's World Wide Web server, the URL is http://www.nceet.snre.umich.edu. You can also e-mail the EE-Link staff at eelink@nceet.snre.umich.edu for more information.

State Profiles in Environmental Education

The trend is toward comprehensive programs

by Abby Ruskey

An awareness and appreciation of their natural and built environment; knowledge of natural systems and ecological concepts; understanding of the range of current environmental issues; and the ability to use investigative, critical-thinking, and problem-solving skills toward the resolution of environmental issues: These are key traits of an environmentally literate citizenry. It follows that they are the key objectives of environmental education.

Nearly every state in the country currently has an environmental education program in some form. However, few states have comprehensive programs of the sort that can foster widespread environmental literacy in the populace.

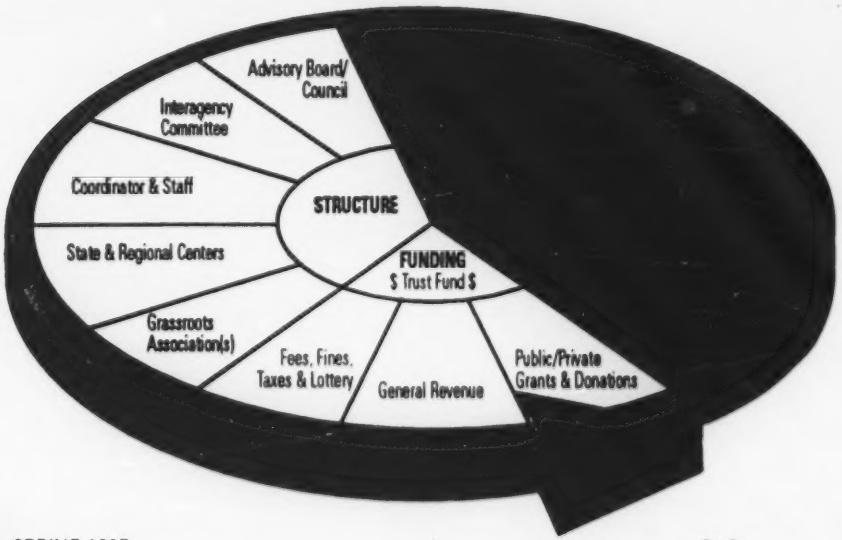
Comprehensive programs infuse environmental education into most or all subject areas and grade levels through curriculum requirements, subject-area frameworks, pre-service and in-service teacher training, opportunities for small grants for teachers and schools, resource guides and networks, statewide advisory councils, interagency networks, and more. The diagram below shows the program, structure, and funding components that—in one combination or another—are necessary for an environmental education program to be comprehensive in scope.

Even a comprehensive environmental education program is only as effective as its implementation and follow-up. For example, a state that has adopted an environmental education teacher-training requirement must ensure that college-of-education professors and other teacher trainers are qualified to provide adequate instruction in environmental education content and methods. Similarly, a state environmental education grants program must be closely administered and evaluated, and results of projects disseminated if citizens are to receive the maximum benefit and if the project is to receive continued support from funders and elected officials. The *initial* success of a program can be determined by state standardized tests, performance assessments, and other methods for assessing changes in students' environmental awareness, attitudes, knowledge, and behavior. The *ultimate* measure of success will be the maintenance of environmental quality and the quality of life for citizens.

The National Environmental Education Advancement Project (NEEAP), based at the University of Wisconsin-Stevens Point, was established in 1991 to assist states and communities in their efforts to fully incorporate quality environmental education programs into K-12 schools. NEEAP has published an organizing manual, produced a video and slide program, created organizer training workshops, established a networking and resource center, and conducted a pilot program working intensively with the states of Hawaii, Illinois, Iowa, Kentucky, and Louisiana. Through this program, NEEAP has learned about the status of environmental education in all states. This article reviews the extent to which states have developed comprehensive environmental education programs.

(Ruskey is Coordinator for the National Environmental Education Advancement Project.)

Environmental Education: Components of a Comprehensive State-Level Program



Status of State Programs

Across the nation, several "model" states have achieved all or most of the components listed in the diagram. These states include Arizona, Florida, Maryland, Minnesota, Pennsylvania, and Wisconsin. At least 30 other states have one or more "cornerstone" components in place on which to build a comprehensive environmental education program. Many of these states, including California, Colorado, Hawaii, Illinois, Idaho, Iowa, Kansas, Kentucky, Louisiana, Maine, Missouri, North Carolina, Oklahoma, Oregon, South Dakota, Tennessee, Texas, Washington, and Wyoming have active state environmental education associations or coalitions that are in the process of strengthening their programs.

• *Environmental education curriculum requirements, guidelines/frameworks, and curriculum guides*—Most states with environmental education legislation (19 states in 1993) had curriculum requirements or recommendations. For the most part, however, these are nonbinding for local school districts. Without a K-12 curriculum planning requirement, teacher training, and other components to back curriculum initiatives, they will have little impact. Instead of requirements, most states use curriculum guidelines and curriculum guides to infuse environmental education content into school subjects. However, they typically cover limited subjects and/or grade levels. To date, no state has a complete program of study in environmental education for grades K-12 supported by environmental education guidelines or outcomes, and state-specific curriculum guides.

• *Teacher training*—Environmental education training programs for certified and practicing teachers are available in all 50 states. However, according to a 1994 study by the National Consortium for Environmental Education and Training, this in-service training is mostly informal, and coordination between programs is practically non-existent. Furthermore, the study points to the low priority that most state education agencies give to environmental education in-service training: "State natural resource agencies, colleges and universities, nonprofit organizations, and school districts all rate higher than state education agencies as providers of EE [environmental education] in-service training . . . the goal of infusing EE into school curricula would benefit from being supported, or even better, championed by state education agencies." In contrast to in-service environmental education teacher training, the majority of states do not provide environmental education instruction for teacher candidates or pre-service teachers. To date, three states—Arizona, Maryland, and Wisconsin—have achieved pre-service environmental education teacher-training requirements. Of these, only one state has achieved full compliance at teacher-training colleges statewide.

• *Environmental education specialists and other staff positions within state agencies*—This is the most common environmental education component in place today, with virtually every state hosting a full- or part-time environmental education specialist position. According to an Environmental Education Associates, Inc. 1993 report, *State-by-State Overview of Environmental Education Standards*, 29 states had full-time specialists; of these, 16 were based in education agencies, and 13 worked for the state natural resource agency. Five states had two full-time specialists and seven states had half-time specialist positions. The remaining 21 states incorporated environmental education coordination responsibilities into positions such as wildlife-education specialist, science-education supervisor, and public-information specialist.

• *Administrative, policy-generating, and grassroots structures*—State environmental education advisory boards/councils and interagency committees, state and regional environmental education centers, and environmental education offices in state agencies are vital for guiding, implementing, and maintaining environmental education programs. Approximately half the states have an environmental education advisory council/board, or an environmental education interagency committee, or both. Half-a-dozen states have state and regional environmental education centers with libraries, computer networks, in-service training programs, state-specific curriculum development projects, and other services for teacher support. Thirty-nine states have grassroots environmental education associations for strengthening state environmental education programs, in addition to professional development and networking.

• *Grant programs and environmental education trust funds*—Seven states (Arizona, California, Florida, Iowa, Maryland, Ohio, Pennsylvania, and Wisconsin) have established competitive programs for small grants that provide

Centralized vs. Decentralized Systems

Under the 10th Amendment to the U.S. Constitution, the control and administration of education fall to the states. The states vary greatly in the degree to which they share this responsibility with local entities. In some states, education policy, frameworks, and curricula are determined by the legislature or state school board and implemented by the state education agency through local school districts. In other states, policy and curriculum are determined at the level of the local school district or the school site, and the state education agency's role is more that of a resource center. States that follow the first model, or have a "centralized" system, typically pursue strategies such as curriculum and teacher-training requirements, environmental education boards, grant programs, and funding from fees and fines to strengthen their environmental education program. Arizona, Florida, and Wisconsin follow this model, although each has unique programs, structures, and funding measures. This year, the states of California, Iowa, and Louisiana have submitted—or will be submitting—comprehensive environmental education bills to their state legislatures.

Environmental education leaders in states with "decentralized" education systems work from the ground up. In Wyoming, one project engaged teachers from most of its 49 school districts to develop a *Wild Wonderful Wyoming* curriculum guide. The teachers also trained their peers in the use of the guide. In Kentucky, a series of statewide workshops will highlight model environmental education school programs that are achieving the goals established by the 1992 Kentucky Education Reform Act. The models will be analyzed for the state legislature in a paper prepared by the Kentucky Environmental Education Council. Emphasis on locally managed school programs in Colorado has resulted in a unique master plan that focuses on locally oriented environmental education, improved communication and coordination among entities interested in environmental education, ready access to information sources, and enhanced teacher training.

incentives to state and local entities with innovative environmental education programs and with the ability to provide matching dollars. These states and two others (Arkansas and Missouri) have created environmental education trust funds for raising dollars and interest income from both public and private sources. Surcharges on pollution fines, resource-use fees, license-plate sales, and private donations are all common revenue "streams" into environmental education trust funds.

• *Environmental education master plans*—Several states have recently completed or are in the process of developing comprehensive environmental education master plans. These states include Arizona, Colorado, Hawaii, Illinois, Minnesota, Missouri, and North Carolina. The plans help to chart a collective vision and a course of action among state-wide environmental education stakeholders. Many states have plans that date back to the 1970s and 1980s and are in the process of updating these. Wisconsin held an Environmental Education Summit in May 1995, to update its master plan. ❑

Cornerstone Programs

The first initiative or "cornerstone" component that states adopt often defines the strength of their environmental education program as it grows and develops. Wisconsin conservationists laid the groundwork in the early 1930s for passage of the first statute to actually *mandate* that conservation education be taught in every public school and that teacher candidates in science and social studies receive instruction in the conservation of natural resources. The conservation education statute was passed by the Wisconsin legislature in 1935. Fifty years later, Wisconsin's statute was overhauled by the next generation of environmental education leaders, and to this day the state's teacher-training programs continue to lead the way nationally. Other initiatives, including a K-12 curriculum requirement, environmental education board, environmental education grants program, state center for environmental education, environmental education specialist position in the Department of Public Instruction, and environmental literacy assessment, were all made possible because of Wisconsin's first environmental education initiative.

In 1949, a Governor's Resource Use Education Committee was established in Florida, one of the earliest efforts to coordinate conservation education activities among state agencies and other entities. Today, Florida's environmental education program is distinguished by its model "Environmental Education Partnership," involving the Florida Advisory Council on Environmental Education, the Florida Department of Education and the Environmental Education Foundation of Florida, Inc. As a result of this partnership, environmental education leaders in Florida have been able to establish multiple cutting-edge funding mechanisms to support the state's environmental education grants program, the environmental education curriculum, and teacher training in the Department of Education and five regional environmental education centers.

Wilhelmine LaBudde family photo collection. Copyrighted.

Wisconsin conservationists laid the groundwork in the early 1930s for passage of the first conservation-education mandate.

Resources Available

Resources developed by NEEAP with the help of other organizations include:

• *Promoting Environmental Education: An Action Handbook for Strengthening EE in Your State and Community*, by Abby Ruskey and Dr. Richard Wilke. This handbook provides state and local leaders with models and suggestions to enhance environmental education programs. It can be ordered from the National Association of Conservation Districts for $22.50 plus $5.00 shipping and handling:

NACD Service Center
P.O. Box 855
League City, TX 77574-0855
or phone 713 332-3402.

• *Environmental Education Advocacy: Everyone's Responsibility* is a 45-minute motivational video on the need for and elements of a successful environmental education program. It can be ordered from:

NEEAP
College of Natural Resources
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
or phone 715 346-4179.

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Environmental Literacy and the College Curriculum

by Richard Wilke

Colleges and universities have a challenge to meet

As the Associate Dean of the College of Natural Resources at the University of Wisconsin-Stevens Point, I share responsibility for the largest undergraduate natural resources program in the country. The 1,750 majors in our college can choose among 30 different academic programs and nearly 200 environmentally related courses. These students are receiving intensive environmental literacy instruction. However, they are a minority.

While many institutions offer environmentally related minors or majors, they do not *require* even basic instruction in environmental literacy. Thus, the vast majority of students are not enrolled in programs focused on the environment; most never even enroll in a general environmental studies course. This article focuses on reaching these students with environmental literacy instruction.

As part of environmental literacy requirements, UW-Stevens Point students gain experience with computer applications.

University of Wisconsin-Stevens Point photo by Doug Moore. Copyrighted

Call to Action

Colleges and universities have been challenged to increase their role in developing an environmentally literate citizenry. *Agenda 21*, the blueprint for action adopted by the world's leaders at the 1992 United Nations Earth Summit, calls for aggressive measures to strengthen the environmental education received by the world's citizens. (See box on page 37.) Universities are specifically asked to play a prominent role in preparing citizens to analyze and resolve environmental issues.

In a similar vein, the Council of State Governments' 1994 book of *Suggested State Legislation* includes model environmental education legislation that is recommended for adoption by state legislatures. The model legislation states: "Universities, colleges and vocational institutions are required to implement programs that encourage environmental literacy and provide opportunities for environmental stewardship among the student population." To accomplish this, universities are directed to implement "an environmental studies course requirement for all graduates, or the development of an integrated general education program that accomplishes environmental literacy through its integration in a variety of courses."

What Should Be Taught

Much has been written over the last 25 years about environmental literacy and strategies for achieving it. In the early 1980s, Harold Hungerford from Southern Illinois University, Ben Peyton from Michigan State University, and I worked together to develop a set of environmental education instructional goals. Our goals have been used around the world for curriculum development and research. We believe that instruction aimed at enhancing environmental literacy must aid citizens in becoming environmentally knowledgeable and, above all, skilled and dedicated to working individually and collectively toward achieving a dynamic equilibrium between quality of life and quality of the environment. In other words, environmental literacy needs to focus on developing responsible environmental behavior.

Harold Hungerford and Trudi Volk from Southern Illinois University reviewed the pertinent literature and concluded that we can maximize college-level opportunities to develop responsible environmental behavior if we proceed along the following lines:

- Teach environmentally significant ecological concepts and the environmental interrelationships implied by these concepts.
- Provide carefully designed and in-depth opportunities for learners to achieve some level of environmental sensitivity that will promote a desire to behave in appropriate ways.
- Provide a curriculum that will result in an in-depth knowledge of issues; that will teach issue analysis and investiga-

(Dr. Wilke is Associate Dean of the College of Natural Resources, University of Wisconsin-Stevens Point.)

University of Wisconsin-Stevens Point photo by Doug Moore. Copyrighted

Coursework at University of Wisconsin-Stevens Point gives students a chance for hands-on investigation.

tion skills as well as provide the time needed for the application of these skills; that will teach the citizenship skills needed for issue remediation and give opportunities for the application of these skills.

• Provide an instructional setting that increases learners' belief that they can make a difference by acting in responsible ways.

Faculty from a variety of colleges and universities have considered what should be taught in order to develop environmentally literate graduates. In *Achieving Undergraduate Environmental Literacy*, a report of a 1990 Pennsylvania System of Higher Education Faculty Development Forum, the following goals were recommended for undergraduate environmental literacy:

• Students must develop an understanding of how humans relate to natural systems and the importance of making wise decisions regarding the use of natural resources and maintaining human habitat fit for life and fit for living.

• Students must develop a knowledge and appreciation of local and global environmental issues.

• Students must develop a firm knowledge of fundamental scientific principles so that they can understand the consequences of human actions on natural systems.

• Students must develop reasoning and problem-solving skills that lead to responsible decision making and action regarding the interaction between humans and the environment.

Faculty and administrators desiring to strengthen the levels of environmental literacy among their students should consider the curricular recommendations of Hungerford and Volk and the goals identified by the Pennsylvania forum participants.

Approaches Being Used

A variety of approaches are being taken by universities to strengthen their environmental literacy instruction.

At Tufts University, an Environmental Literacy Institute (TELI) was established in 1990. The Institute trains faculty to integrate environmental concepts and issues into college courses. Faculty members participate in summer workshops to help them generate ideas for incorporating environmental literacy in their courses. Examples of resulting course revisions: an English course using novels such as *Grapes of Wrath* to discuss how the environment relates to culture; a drama professor involving students in role playing using environmental themes; and a mechanical engineering course in which students focus on getting more energy efficiency out of a machine, thereby consuming fewer resources. The sixth annual TELI faculty development workshop was held May 31 through June 9, 1995.

In June 1992, Harvard University emulated Tufts by creating the Heinz Professorship to encourage Harvard faculty members who are not specializing in the environment to integrate environmental elements in their courses. Similar positions have been created at several othe universities.

While the approaches taken by Tufts and Harvard create opportunities for non-majors to take environmentally oriented courses, they do not reach the majority of college students. This can only be accomplished by requiring environmental literacy instruction in the general educatio curriculum.

The importance of addressing environmental literacy in the general education curriculum was described by George Dennison, President of the University of Montana. Dennison stated: "All institution should seek to infuse environmental content into the curriculum, including general education programs. The vast majority of students will not pursue environmental programs or majors, but will gain their understanding of environmental issues and problems from their general education and elective courses. If we intend to have an effect upon ecological literacy, we must do so through curricular diffusion and general education."

University of Wisconsin-Stevens Point Model

At the University of Wisconsin-Stevens Point (UW-SP), the general education curriculum is being used to enhance the environmental literacy of our students. In 1990, Chancellor Keith Sanders appointed a broad-based Curriculum Task Force to determine whether the existing general education requirements adequately prepared students to address societal needs and expectations. The task force reviewed the literature to determine trends in university general-education requirements. They examined the requirements at scores of other universities and held a series of hearings to solicit faculty input.

After nearly two years of study, the task force identified 14 competencies described as "Skills and Knowledge for UW-SP Students of the 90s and Beyond." Environmental literacy was identified as one of the competencies to be expected of all UW-SP graduates.

Next, the faculty committee responsible for general degree requirements was asked to determine whether the existing requirements adequately addressed each of the 14 competencies. Regarding environmental literacy, they concluded that the existing requirements did not. Consequently, the committee developed, and the UW-SP Faculty Senate and Chancellor Sanders approved, a new environmental literacy requirement for all students. This means that environmental literacy is included with critical thinking, writing, speaking, civic literacy, and scientific literacy as part of the basic education provided to UW-SP students to help them function in the 21st century.

To graduate from UW-SP, students must complete a three-credit Environmental Literacy (EL) course. The following criteria apply to EL courses: An EL course may be proposed by any department, EL courses should not have prerequisites, interdisciplinary treatment of issues is required, team teaching and cross-disciplinary teaching are encouraged, and EL course proposals must clearly show how the course is structured to achieve EL objectives.

The goals recommended in the Pennsylvania report, *Achieving Undergraduate Environmental Literacy*, were used as a starting point in developing the UW-SP EL objectives. For a UW-SP course to be approved for EL credit, the course should provide students with the ability to:

- Describe the relationship of human society to natural systems and how the two have affected each other.
- Analyze a wide variety of historic and current environmental issues, ranging from local to global importance.
- Describe the ecological, political, social, and economic implications of selected environmental issues and assess alternative solutions to those issues.
- Identify, describe, and evaluate their own individual impacts on the environment.

The box on this page shows courses meeting the UW-SP environmental literacy requirement. Most environmental literacy courses are open to students from any major. Some, such as "Introduction to Environmental Study and Environmental Education," are targeted to special populations—in this case, prospective teachers, who learn not only content but also instructional methods.

Will the environmental literacy requirement at UW-SP raise the environmental literacy of graduates? I believe it will. Future graduates should be more environmentally knowledgeable and, above all, skilled and dedicated to working individually and collectively toward achieving a dynamic equilibrium between quality of life and quality of the environment. To ensure that this happens, efforts will be made to help the faculty understand and apply the strategies recommended by Hungerford and Volk to maximize environmentally responsible behavior. The application of these strategies coupled with instruction focused on the environmental literacy objectives should result in graduates who are environmentally literate and responsible.

The hope is that increasing numbers of colleges and universities will follow examples described here and take steps to incorporate environmental literacy instruction in their general education curriculum. There is no other instruction more basic than that which focuses on perpetuation of both environmental quality and the quality of life. ❑

Environmental Literacy: A Course Catalogue

American Environmental History—Students analyze the ways in which one generation of decisions regarding nature limit the future decisions or precipitate reactions that move the human-nature interactions in a different direction.

Urban Environmental History—Students evaluate the ways activities within American cities have placed demands on resources. They also examine the ways urban development altered public perceptions of wilderness, nature, and human society, and the ways these attitudes have influenced urban sanitation, conservation, preservation, industrial development and resource allocation.

The Physical Environment Under Stress—Students apply physical geographic principles and processes to understand selected human impacts on atmosphere, water, land, and biota. They are involved in detailed, interdisciplinary analyses of several environmental problems, including their causes, consequences, and solutions.

Environmental Ethics—Students examine and evaluate philosophical, religious, and scientific concepts and values that have structured human attitudes toward the environment. A wide variety of environmental issues are explored, and students identify, describe, and evaluate their individual impacts on the environment. Readings such as *The Sand County Almanac* are required.

Introduction to Environmental Study and Environmental Education—Students analyze natural, social, and economic factors influencing the quality of the environment. Ecological relationships and principles are studied and their relation to population growth, pollution, resource allocation and depletion, conservation, technology, and urban and rural planning. An overview of K-12 environmental education content and methods is also included.

Politics and the Environment—Students learn the interrelationship of politics and the environment. They read *Tragedy of the Commons* and consider the role of government in dealing with environmental regulation. The National Environmental Policy Act and other environmental legislation is examined. Students also analyze organizations attempting to influence environmental policy and evaluate their own attitudes regarding environmental policy.

Educating Environmental Managers for Tomorrow

The environment must be part of the bottom line

by Julie Jubeir

The following article is based on the experiences of the Management Institute for Environment and Business (MEB) and its Business Environment Learning and Leadership (BELL) program. The BELL program is a consortium of 25 business schools dedicated to integrating the environment into their curricula. Together, these 25 institutions confer over 10 percent of the graduate management degrees given each year in the United States.

(Jubeir is the Director of Educational Programs for the Management Institute for Environment and Business. She holds a Master of Business Administration degree from the J. L. Kellogg Graduate School of Management at Northwestern University and a Bachelor of Arts degree in economics and environmental studies from Bowdoin College.)

The business world has begun to acknowledge that the environment is playing an increasingly prominent role in all facets of American society. A recent survey by the management consulting firm McKinsey & Company found that 92 percent of CEOs and board members believe that the environment should be a top management priority; however, only 35 percent say their companies have successfully adapted business strategy to anticipated environmental developments, and only 37 percent believe they have successfully integrated the environment into everyday operations. As reported in an article titled "It's Not Easy Being Green" in the May/June 1994 *Harvard Business Review*, McKinsey & Company concluded that managers lack a conceptual framework that allows them to integrate the environment into their decision making.

Since business schools are the primary training ground for future managers, they should teach their students how to integrate business and the environment so that their graduates will be equipped with this conceptual framework when they enter the workforce. Professor Mark Cohen at the Owen Graduate School of Management at Vanderbilt University echoes this imperative: "Business schools should train managers who can understand how to create new opportunities for their firms and how to manage environmental risks in a profitable and responsible manner, because this is what leading companies are beginning to demand."

The critical question is, then: How are business schools incorporating environmental issues into their institutions?

In 1989, EPA conducted an informal survey to examine the treatment of environmental issues by the nation's business schools. The Agency found that no school offered entire courses or an environmental major or concentration. Further, the survey found that very little time was spent on environmental issues in core management disciplines. If attention was devoted to environmental issues, it was very reactive in nature, focusing on the environment as a cost to the company—not as a way to exploit new market opportunities.

At the time of this informal survey, there existed very few curricular materials that incorporated environmental issues. Faculty had difficulty finding appropriate case materials. Since the survey, this situation has improved, due largely to the efforts of the Harvard Business School; National Wildlife Federation; Western Business School at the University of Ontario; INSEAD, a leading French business school; and the Management Institute for Environment and Business (MEB). (See "Case Studies" box on page 33.) Current case materials help students realize that integrating business-and-environment issues into a company's strategy and operations can lead to competitive advantages. Material now exists for schools to integrate such issues across the curriculum.

As discussed below, the efforts schools so far have made to integrate environmental issues into their programs can be categorized into three groups: efforts that extend beyond the business school, or the "extension" approach; efforts to create environmental majors or electives, the "depth" approach; and efforts to integrate

the environment into existing business courses, the "infusion" approach. Most schools fall into more than one category.

Extension Approach

Several business schools are capitalizing on existing university resources to create joint degree programs with their universities' schools of natural resources. Examples include: Duke University, University of Michigan, and Yale University. Typically, a student obtains the dual degree in three years, adding an additional year to the normal business degree.

Other business schools have created centers of expertise. The University of Houston has created the Institute for Corporate Environmental Management to foster improved organizational competitiveness through effective management of environmental issues facing industry. This institute serves to discover the needs of industry and attempts to fill those needs through executive programs. Northwestern University (Kellogg) has established the Kellogg Environmental Research Center to provide leadership in defining managerial perspectives on environmental issues. This center seeks to serve as a role model for broadening the environmental agenda of business schools.

World Bank photo.

Depth Approach

Most business schools have chosen to address environmental issues within their own degree programs. They have created environmental management majors or business-and-environment course electives. For example, the University of Washington offers an environmental major. The core courses in the major are team taught and cover the environment as it relates to all other business disciplines. Students can also choose from a variety of electives, including Environmental Accounting, Environmental Marketing, a year-long consulting project, and Environmental Law.

The American Graduate School of International Management (Thunderbird) offers a course in which students explore how the environment affects marketing decisions. The University of Virginia (Darden) offers a Governance class in which students face a real environmental problem and discover firsthand how environmental decision making works by taking the roles of diverse stakeholders. Kellogg has innovative elective courses which involve trips over spring break to investigate in the real world what the students have been studying during the quarter. Last year students went to Costa Rica, where they worked in teams to investigate the eco-tourism industry and environmental initiatives such as paper production from the waste products of banana processing.

Infusion Approach

In addition to extension efforts and the "depth" approach, most schools are also opting for the "infusion" approach to ensure that all students are exposed to environmental issues. This can be achieved in a variety of ways. Indiana University, for example, recently conducted its second annual "Environment Week," during which the entire class of 250 students focused on business-and-environment issues for the full week.

Other schools consistently use business-and-environment cases throughout their curriculum. Students at the University of Wyoming's School of Business are exposed to environmental issues in their

Bananas for processing: On a trip to Costa Rica over spring break, Kellogg students investigated a technique for making paper out of the wastes of banana processing.

standard economics courses. At Dartmouth College (Tuck), one of the core required courses, "International Leadership," has a strong component of business and the environment. At the University of Washington, as well as many other schools, business-and-environment cases are beginning to penetrate the core management curriculum.

Business schools are using a variety of approaches to integrate the environment into their programs. The avenue they pursue depends on the objective sought: greater depth for interested students or improved awareness for all students. Most pursue a hybrid of both.

Through its Business Environment Learning and Leadership (BELL) program, MEB assists schools by developing and disseminating business-and-environment case materials, training faculty, helping to create collaborative partnerships with communities and businesses, and creating student internship opportunities. In this way, BELL is trying to help create future managers who will incorporate environmental considerations into the business decision making. ❑

Case Studies

To aid business schools in their efforts to bring business-and-environment cases into management education, MEB has created a comprehensive annotated bibliography of cases and videos. It includes cases and abstracts from a variety of sources including Harvard Business School, MEB, INSEAD, University of Western Ontario's Western Business School, and the National Pollution Prevention Center. This user-friendly guide is divided by discipline and indicates whether a case is a simulation exercise or a conventional case.

MEB has also published a book of simulation exercises, *Stakeholder Negotiations: Exercises in Sustainable Development* (Available from Richard D. Irwin, Inc. at 800 323-4560). These exercises take the form of stakeholder negotiations in which students play the role of representatives from different groups involved in an environmental problem. For example, a chlorine simulation exercise, developed by Alan Beckenstein of the Darden School at the University of Virginia in collaboration with MEB, describes a provocative policy debate in which representatives from industry, EPA, and Greenpeace come together to define a common environmental path for the pulp and paper industry.

Conventional cases, in contrast, force students to confront a business challenge with limited information and to recommend a course of action. In MEB's BMW case, they learn that the German government has issued draft legislation requiring the takeback of used vehicles and the reduction of scrap materials from these vehicles. Students must decide how, if at all, BMW should modify its existing takeback infrastructure and how the company should handle recovered scrap materials.

What is MEB?

The Management Institute for Environment and Business (MEB) is a nonprofit initiative that empowers future leaders to contribute to environmental progress by engaging business, universities, and communities in creative problem solving. MEB helps universities, graduate schools, and corporations integrate environmental issues into their educational programs and provides new thinking about the relationship between business and environment. For more information, please contact MEB at 1101 17th Street, NW., Washington, DC 20036.

The MEB program is supported by a variety of organizations including: Philip Morris Companies Inc.; AVINA; The William and Flora Hewlett Foundation; National Environmental Education and Training Foundation; GE Fund; Virginia Environmental Endowment; the National Fish and Wildlife Foundation; the Moriah Fund; the John D. and Catherine T. MacArthur Foundation; AT&T; Baxter International Inc.; Church & Dwight Company, Inc.; the Henry M. Jackson Foundation; the Curtis & Edith Munson Foundation; the Rockefeller Brothers Fund; Alcoa Foundation; Bristol-Myers Squibb; WMX Technologies, Inc.; Kraft Foods; and Amoco. MEB also has a cooperative agreement with EPA's Office of Policy, Planning, and Evaluation to study the effects of environmental regulation on industrial competitiveness and innovation.

Learning for Life in the 21st Century

Hope lies in educated choices

by Noel J. Brown

On September 30, 1994, Dr. Noel J. Brown—then the Director of the United Nations Environment Programme (UNEP)—spoke in San Francisco at the National Forum on "Partnerships Supporting Education about the Environment." In his remarks, Dr. Brown examined the interconnections between environmental education, economic conditions, and sustainability in the broadest sense. An excerpt from his speech follows.

(Until his recent retirement, Dr. Brown served as Director of the United Nations Environment Programme.)

Even the most casual reading of the Earth's vital signs reveals a planet under stress. When you look at the data, they present a rather stark picture of human presence and rather ominous prospects for the human future.

Nevertheless, Ted Turner some years ago remarked that, although the problems facing our planet have never been greater, neither have the skills and talents available for solving the problems. The question is how to tap into those skills and make them work for us and the world.

Now, I believe we have an opportunity. The Earth Summit at Rio, whatever else it may or may not have achieved, was able to bring about a major global consensus on a new agenda for action. That agenda, as you know, is called *Agenda 21*. It would seem to me that, if you are trying to design a curriculum, you could do no better than to make *Agenda 21* the basis of that curriculum. It's a very well documented statement, and it's science-based. I hope that you will encourage your young people to become acquainted with it.

If you are trying to design a curriculum, you could do no better than to make Agenda 21 *the basis of that curriculum.*

Shortly after our summit, my office came up with the idea of promoting a Youth *Agenda 21* by encouraging young people to prepare their own document. We are rather impressed with the result, which is called *The Rescue Mission*. This is the product of kids who took the original *Agenda 21* document and rewrote it. Let me share a secret: It may be the only volume that is read, because it's written in a language that people can understand. It's also very well illustrated.

I pass this on to you because you may want to challenge your own young people to take a look at *Agenda 21* and rewrite it. Why not have your class take the action plan of Cairo and rewrite it in a language that young people can understand, particularly young people of child-bearing age? Have them take that text and make it their own. In the process they will become familiar with what their parents have decided in their name.

Agenda 21 has 40 chapters. Chapter 36—on education, training, and public information—suggests that we experiment with new modes of learning, that we look to the arts, entertainment, and advertising communities to help us tell the story. We at UNEP are reaching out to the arts and entertainment communities because they are our most effective communicators, and we must find a way of communicating the knowledge we have acquired. Last April, I launched a series at the United Nations called "Art and the Earth: A Dialogue with Nature," trying to encourage artists to use nature as a canvas and the Earth as a storyline.

My interest is simply to encourage creativity and innovation. We have also brought in the advertising community, because they have become a very powerful force in any matter dealing with sustainability and patterns of consumption and lifestyle. U.S. educators must find ways of bringing these subjects into their classrooms.

Chapter 30 of *Agenda 21* urges the

Tourism means big revenues, but profits depend on sustainable practices. Here, tourists explore the Amazon rainforest.

Photo courtesy of International Expeditions, Inc. Copyrighted

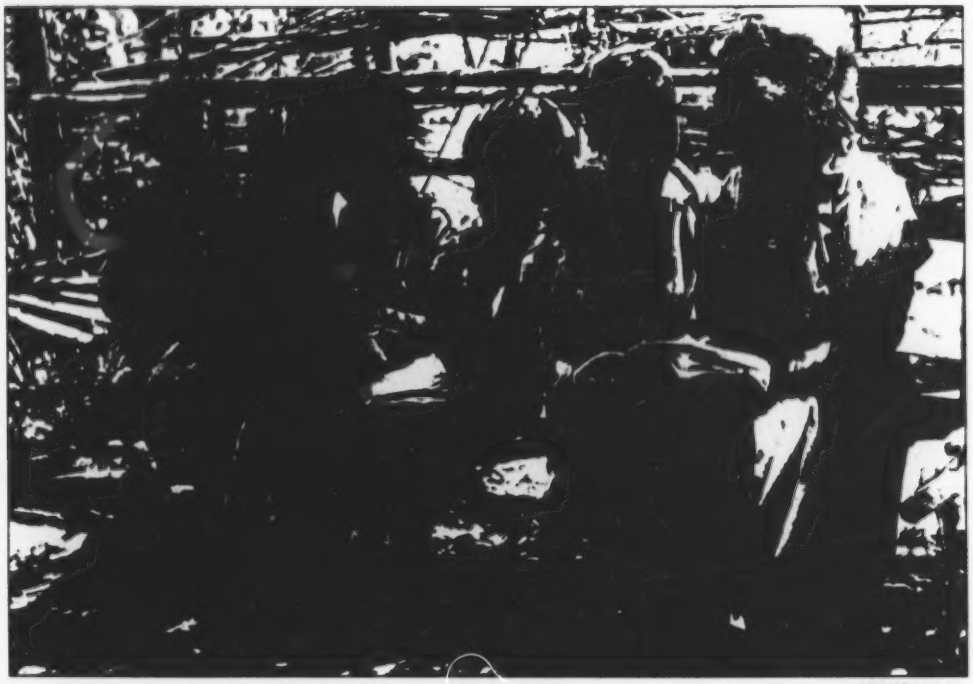
business community to become partners with us in moving the process of sustainability forward. It explicitly calls for new entrepreneurism and for seeking ways in which we can use the marketplace to ensure that environmental costs are incorporated in pricing structures. We in the environmental community don't fully understand how business works, and quite often business leaders seem to feel that environmentalists are fuzzy little birdwatchers and backpackers who don't know what's happening in the real world of business. Partnership between us is something that we need to encourage immediately.

Let me give just two examples that will illustrate why I know this can work and why we need to make it happen. About three weeks ago, I hosted a conference at the United Nations on fashion and the environment. Now, when I tell this story, people tend to think I'm talking about receding hemlines or plunging necklines. But the fashion industry is a $200-billion-a-year industry. It is a very heavy user of fibers, of skins and hides, of energy and chemicals, of transportation and packaging. To make a partner of this industry is important, and so I introduced a fashion leadership award for environmental excellence.

Three companies won the award this year. The first was called Deja Shoe, which manufactures a shoe product from 100-percent recycled materials, demonstrating that waste can be looked at as a resource the second time around. The second is called Green Cotton, and they are experimenting with technologies that will make for an environmentally friendly cotton product—cotton traditionally is a very dirty industry. And, finally, we honored a group called Coyuchi that is growing colored cotton—no dyes, no chemicals, and they already have five shades.

It's in our interest to make these companies our partners because they are demonstrating that sustainability can work and still be profitable. I want to urge all my environmentalist friends: Don't be afraid of profit making! My hope is that we can bring the environment into the marketplace, that shopping can become an environmental experience. And we can bring that about by educating the shopper, the consumer, to make it an environmental experience. If one cent of every dollar we spend were spent with the environment in mind, we would be well on the road. In the end, it will be the consumer who makes the difference. Even if I am the Pope, I am a consumer. And if the full potential of the consumer were brought to bear on the marketplace, I can assure you it would make a difference.

Let me give one other example of how business and the environment can work together to move the process of sustainability forward. Ten days ago I was in Montreal at a conference on tourism, sustainable tourism, and the environment. Again, people tend to think I'm talking about a cocktail industry until they discover the statistics of tourism. In 1992, the industry generated revenues of $3.7 trillion; that's five



World Bank photo.

Agenda 21 ***advocates education to improve the environment. Shown, children attending school in Holetta, Ethiopia.***

percent of the gross world product. They employed 100 million people around the world. That's one out of every 10 jobs in the world. By the year 2000, they will become the world's largest industry, outdistancing petroleum, steel, and automobile manufacturing. How can you talk sustainability without talking tourism and the support systems that are involved? We can also demonstrate that tourism is a peace-based industry; it can even be a promoter of peace. If you have any doubt about that, try to imagine a traveler wanting to go to a war zone for a holiday.

To show you what I mean, let's consider Ireland. In late August, the IRA announced a unilateral cease fire. Two weeks later Hilton announced they were going to build a $26 million hotel in the heart of Belfast. Peace and tourism go together. When Egypt signed the accord with Israel, Egyptian tourism blossomed. After partition declined, South African tourism blossomed. We can see this occurring across the world.

Tourism, peace, and the environment can work hand in hand. The challenge is to create ways of educating the tourist traveler in environmental sustainability. What modes of learning can we as educators design for them? I, for example, am trying to bring the Inflight Entertainment Network into the loop. All of us who travel a lot know that the Inflight Network is an unbelievably rich source of information. Can we design programs that can be built into inflight entertainment? Walk into a corridor at the San Francisco Airport and you will see that art is now being displayed. Some very interesting exhibitions are bringing art to the people. We need to bring the idea of sustainability to the people.

I would like to encourage you as educators to look at *Agenda 21*, especially those chapters that call for partnerships with the private sector, and discover the opportunities that are open to you. My own feeling as an aspiring optimist is that trend, as Renée DuBois once said, is not destiny, and that a future based on the extrapolation of existing trends is not inevitable anymore than doomsday. The future that we choose is the one most likely to prevail. The challenge is to develop a capacity for choice. And that is where you as educators come in. ❑

What is UNEP?

The United Nations Environment Programme (UNEP) is the action agency of the United Nations for environmental matters. The Secretariat, guided by the Governing Council, located in Nairobi, Kenya, is a focal point for environmental matters throughout the United Nations. It serves as a mechanism for international cooperation in matters relating to the environment—monitoring significant changes in the environment and encouraging and coordinating sound practices.

UNEP was created as a result of the Stockholm Conference on the Human Environment in 1972. Under the plan developed by the Conference, the programme is intended to be responsive to the major environmental issues facing both the industrial and the developing areas of the world, such as the ecology of rural and urban settlements, the relationship between environment and development, natural disasters, and the preservation of terrestrial ecosystems. UNEP also promotes environmental law and education and training for managing the environment. Its tasks are assigned to the programme by various U.N. bodies and meetings and conferences. The plans and projects drawn up in the framework of the programme are usually put into practice by member country governments and other U.N. agencies.

The programme's Governing Council is composed of representatives from 58 countries (16 African; 13 Asian; 10 Latin American; 6 Eastern European; 13 Western European and other countries).

—Eds.

Agenda 21's Plan for Education

The United Nations Conference on Environment and Development held in Rio de Janeiro in 1990, adopted Agenda 21, *an ambitious program for achieving sustainable development in the 21st century.* Agenda 21 *has 40 chapters; Chapter 36 focuses on "Promoting Education, Public Awareness and Training." A sampling of its contents follows:*

. . . Both formal and nonformal education are . . . critical for achieving environmental and ethical awareness, values and attitudes, skills and behavior consistent with sustainable development. . . .

Governments should strive to update or prepare strategies aimed at integrating environment and development as a cross-cutting issue into education at all levels within the next three years.

Countries are encouraged to set up national advisory environmental-education coordinating bodies or round tables representative of various environmental, developmental, educational, gender and other interests, including non-governmental organizations, to encourage partnerships, help mobilize resources, and provide a source of information and focal point for international ties.

Schools should involve school children in local and regional studies on environmental health, including safe drinking water, sanitation, food, and ecosystems . . . linking these studies with services and research on national parks, wildlife reserves, ecological heritage sites, etc.

Countries . . . could . . . establish national or regional centers of excellence in interdisciplinary research and education in environmental and developmental sciences, law, and the management of specific environmental problems. Such centers could be universities. . . .

Governments and educational authorities should foster opportunities for women in non-traditional fields and eliminate gender stereotyping in curricula. This could be done by improving enrollment opportunities, including females in advanced programs or students and instructors, reforming entrance and teacher staffing policies and providing incentives for establishing child-care facilities. . . .

There is still a considerable lack of awareness of the interrelated nature of all human activities and the environment.

Countries and the United Nations system should promote a cooperative relationship with the media, popular theater groups, and entertainment and advertising industries by initiating discussions to mobilize their experience in shaping public behavior and consumption patterns and making wide use of their methods.

Countries, in cooperation with the scientific community, should establish ways of employing modern communication technologies for effective public outreach. National and local educational authorities . . . should expand . . . the use of audiovisual methods, especially for rural areas in mobile units, by producing television and radio programmes for developing countries, involving local participation, employing interactive multimedia methods and integrating advanced methods with folk media.

Countries should promote . . . environmentally sound liaisons and tourism activities, . . . making . . . use of museums, heritage sites, zoos, botanical gardens, national parks, and other protected areas.

Countries . . . and non-governmental organizations should encourage mobilization of both men and women in awareness campaigns, stressing the role of the family in environmental activities. . . .

Training is one of the most important tools to develop human resources and facilitate the transition to a sustainable world. It should have a job specific focus, aimed at filling gaps in knowledge and skill that would help individuals find employment and be involved in environmental and development work.

National and professional associations are encouraged to develop and review their codes of ethics and conduct to strengthen environmental connections and commitment. The training and personal development components of programmes sponsored by professional bodies should ensure incorporation of skills and information on the implementation of sustainable development at all points of policy and decision-making.

Countries should encourage all sectors of society such as industry, universities, government officials and employees, non-governmental organizations and community organizations, to include an environmental management component in all . . . training activities. . . .

Countries should develop a service of locally trained and recruited environmental technicians able to provide local people and communities, particularly in deprived urban and rural areas, with the services they require, starting from primary environmental care. . . .

Rescue Mission: Planet Earth

It's not just a book—it's a call to action

by David R. Woollcombe

Following the 1992 United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil, some 10,000 children in about 100 countries worked in 1993 with Peace Child, an international organization dedicated to education for a better world, to create a Children's Edition of *Agenda 21*. Twenty-eight young editors from 21 countries came together to edit the book which they called *Rescue Mission: Planet Earth*. There are about 270,000 copies in print in 14 languages, making it something of a bestseller among books sponsored by the United Nations.

The young editors were determined that the book should not remain a "pretty picture book to sit on coffee tables"; rather, it should become an action manual, educating young people in how they can become actively involved in initiatives for sustainable development. The U.S. edition is published with an activity booklet bound into it. In 1994, a team of students from Sierra Leone worked to create the first *Rescue Mission Action Update*. It contained an "action challenge" inviting young people to prepare an Agenda 21 for their school using the same framework of analysis used in the original *Agenda 21*.

A second edition action update was prepared by interns from the United Kingdom, Germany, Kenya, Finland, and Russia in June and July 1994. It reported on activities that Rescue Mission groups and other groups such as Greenpeace, Friends of the Earth, and Lifelink were pursuing to achieve *Agenda 21* goals. These included, among others, a project taken on by a group of Finns to work with their "twin" schools in Namibia showing them how to build solar box cookers; young people's involvement in the saving of the Delhi Ridge; and a 17-year-old Russian student's personal campaign to clean up the source of the River Volga. The update had an action challenge linked to the United Nations' 50th anniversary: Set an agenda for the United Nations in the 21st century. This produced so much material that Peace Child is producing another book to be released in the fall of 1995.

The third action update focuses on a local Agenda 21. It has an action challenge showing how kids can take a lead in creating one. The challenge takes Peace Child back to its musical roots, proposing that young people invite their counselors, teachers, parents, and peers to a performance of the Rescue Mission musical: The twist is that, 10 minutes into the performance, it breaks down into a Donahue-style show where the audience members are empowered to create an "Instant Local Agenda 21" for their community.

It also instructs young people and teachers on ways to get involved in monitoring their government's progress in implementing *Agenda 21*—in particular Chapter 25, the one relating to youth participation in decision-making. This process is part of the search for "indicators of sustainable development" now going on worldwide. The youth component of this is being handled by Rescue Mission and will climax in what the United Nations calls a "Youth Intersessional Meeting" in April 1996.

Rescue Mission was sponsored by four U.N. agencies—UNDP, UNEP, UNESCO, and UNICEF—with assistance from the Dutch Foundation for Environmental Awareness. Representatives of these, plus two youth representatives of Rescue Mission and the publisher form a coordinating committee which sets strategy for the future. The current strategy being promoted to all Rescue Mission groups includes:

- Preparation of curriculum material to get *Agenda 21* into the classroom.
- Production of training sheets and manuals to assist young people in developing Rescue Mission groups throughout the world.
- Compiling an action database listing activities undertaken by young people in pursuit of *Agenda 21* goals.
- Continued outreach and promotion to youth and educational groups.
- Bi-monthly electronic focal points meeting at which student interns at the Rescue Mission headquarters in England hook up with other members of the Rescue Mission network for a structured meeting and training via fax, phone, and computer conference. (This was one of the most popular initiatives of our first year in operation.)
- The creation of a new Rescue Mission unit within the United Nations which will be a kind of U.N. youth agency in which power is shared equally between youth and adults. It will network activities between existing groups, especially those that offer opportunities for environmental service overseas.

For further information about Rescue Mission, please write to:

Rescue Mission (USA)
11426-28 Rockville Pike, #100,
Rockville, MD 20852, USA
Fax: 301 468-9431

or

Rescue Mission Headquarters
The White House
BUNTINGFORD, England SG9 9AII
Fax: 011 44 176 327 4460

For copies of the book, please call the publisher, Kingfisher USA, at 800 497-1657. ❑

(David Woollcombe is President of Peace Child International, an educational charity whose mission is to "empower children." He founded the organization in 1982 in Washington, DC., with the musical Peace Child, *a story of Soviet and American children ending the Cold War through youth exchanges. It became a leader in the citizen diplomacy movement, arranging the first Soviet-U.S. youth exchange in 1986. He added an environmental component to their work in 1988 with a play called* Earth Child.

The organization produced its first book, A Children's State of the Planet Handbook, *for the Rio Earth Summit.* Rescue Mission: Planet Earth *was its second book, and it has just completed a third,* Rescue UN: a Young People's Guide to the Past, Present and Future of the United Nations, *to be released in the United States this fall.)*

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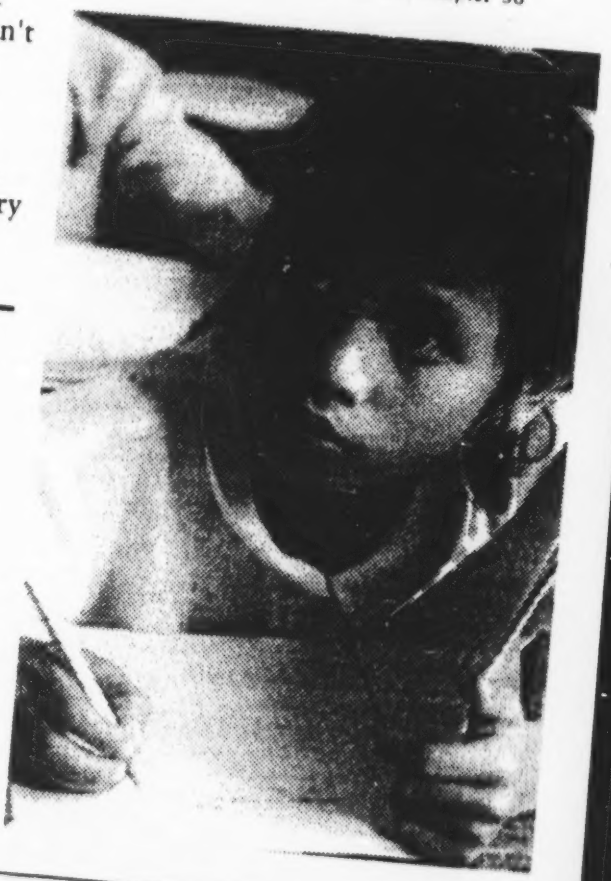
TO WANT + TO KNOW = TO ACT

Make environment and development education available to people of all ages.

Agenda 21, chapter 36

Lack of education is one of the biggest obstacles to development. If people don't know what things are harmful to the environment, how can they respect it? Many people in the world don't even know how to read or write. All people, both adults and kids, have to get primary schooling before they can be taught about environment and development.



The Need of Education

Imagine how dreary life would have been;
Living in ignorance and monotony,
Staring at the everyday life roll by—
Without a care.....
Writing scribbles on the dead sand,
While glancing at the once brilliant horizon.

Someone wants to break the spell,
Their inability to express strong feelings held back
for so long, the inability to fight for their rights
and get what they longed for.
Dust and steam torment the lonely man,
But to achieve his goal, he must fight.

But when he comes back, he shall be victorious;
And will bring a thought, an intelligent teacher,
To bring a colorful, bright rainbow to lighten the way;
To change our futures, for the better...
To help us live.

Portia Villanueva, 11, Philippines

"I personally think if women are given a real education they will strive hard to do their very best. For instance, if I had no education I wouldn't have had the opportunity to attend the Editorial Meeting of the Children's Edition of Agenda 21 and get the book published for a better future."

Mary Edet, 15, Nigeria

AGENDA 21 SAYS:

- **Make basic education available to as many people as possible.**
- **Set up training programmes on sustainable development.**
- **Promote awareness on environment, and make use of media and the entertainment industry.**
- **Promote the knowledge of indigenous people.**
- **Create partnerships with companies in the developing countries to teach environmental management.**

A Comeback for Prospect Park

Lessons learned the hard way are put to work

by Roy Popkin

Half a century ago, Betty Smith's best-known novel, *A Tree Grows in Brooklyn*, brought fame to one tree in one backyard. Today, hundreds of volunteers and a dozen or so city employees are hard at work striving to restore a 525-acre woodland and open area called Prospect Park, Brooklyn's last forest and a natural area which serves as a "community backyard."

Their work begins a 25-year effort to revitalize the 129-year-old park, which serves upwards of 6 million visitors each year. This urban park renewal is funded in part by the city, and in part by the Prospect Park Alliance, a group of private supporters.

According to the *New York Times*, Prospect Park has been rated the most beautiful of New York City's many parks, outranking even better-known and much larger Central Park in midtown Manhattan. Several years ago, an anonymous *New York Times* writer began a story on the park as follows:

> A leisurely stroll across Long Meadow. A brisk hike through the woods to the top of Lookout Hill. Perhaps a picnic in a paddle boat, mingling with the swans. This is Sunday in the Park—Prospect Park—as it was meant to be. . . . Prospect Park was considered the ideal showcase for what they deemed essential elements of an urban oasis. . . .

Today's extensive restoration effort is being undertaken in spite of steep budget cuts throughout the city's agencies. It is a tribute to the dedication of the park's small staff, the leadership of the Prospect Park Alliance, and the desire of the community to renew and improve the park's role as their ecological backyard. A $1.3 million grant from the Lila Wallace/Readers Digest Foundation will be devoted largely to educational and outreach activities.

Brooklyn, today, is a crowded area of almost 3 million people at the western end of Long Island. Its landscape was formed by Ice Age glaciers, and Prospect Park sits on the Harbor Hills moraine, which runs the full 110-mile length of the island. The northern part of the park marks the southernmost point reached by the Wisconsin Glacier 10,000 years ago.

The park's southern meadows are where sand, gravel, and clay spread over the land from the great river of ice. The glacier's impact ultimately produced a diversity of plant life common to eastern deciduous forests and coastal plains. In pre-Colonial times, the park's forest included oaks, chestnuts, hickory, and, in the lowland areas, red maples, sweet gum, and sour gum trees. Early settlers farmed the area but generally left the forest alone until the Revolutionary War. Seven years of fighting and British occupation led to the destruction of the forests to provide firewood and vegetables for the British troops.

Prospect Park was created in 1866 by master landscape architects Frederick Law Olmsted and Calvert Vaux to provide the growing city of Brooklyn with open space comparable to the recently completed Central Park in Manhattan, and according to Olmsted and Vaux's 1866 annual report, to give visitors:

> . . . the feeling of relief experienced . . . on escaping from the cramped, confined and controlling circumstances of the streets of the town; in other words, *a sense of enlarged freedom*. . . [emphasis theirs].

(Popkin is a writer-editor in EPA's Office of Communications, Education, and Public Affairs.)

Courtesy of Prospect Park Alliance. Copyrighted

Some of today's stresses on the park come from the original design and subsequent lack of maintenance. Two thousand workers took six years to build Prospect Park. Olmsted and Vaux meticulously plotted the trees and shrubs; unfortunately, they included such exotic or non-native varieties as sycamore, Norway maple, and Japanese knotweed and paper mulberry plants. Well suited to poor soil and a city environment, these trees and shrubs crowded out native species or deprived them of light and moisture. Recent surveys show that about a fourth of the forested area has lost its natural cover and that 22 percent of the ground in the core forest is bare or eroded.

Prospect Park now sits in the middle of a crowded, diversely populated area of apartment houses, row houses, small single-family homes, and small neighborhood businesses. Its most famous neighbor was Ebbetts Field, home of the Brooklyn Dodgers. The park is on the National Register of Historic Places; one well-known thoroughfare passes along its eastern edge—Flatbush Avenue.

The park has many outstanding features. The Soldiers and Sailor's monument commemorating the Civil War dead at the Park's main entrance is one of the few of its type in Brooklyn that is found in guidebooks for New York City. A beautiful fountain, just north of the memorial archway, is the background for thousands of wedding party photographs. An ingenious interlocking series of falls, pools, and streams winds through the park and enters a man-made 60-acre lake. The Italianate-style Boathouse was built in 1905. The Picnic House overlooks a large picnic grove, a small children's historic house and museum, and a lovely cul-de-sac, called Lullwater, that features a stalwart Scottish elm descended from one of the original trees. In a grove near

Janine St. Germain photo. Prospect Park Alliance. Copyrighted.

A lot of work will be done by volunteers, in exchange for a course on forest ecology, horticulture, and related matters.

the 120-year-old Concert Pagoda, towering London plane trees and small-leafed lindens look down on busts of Mozart and Beethoven. There are facilities for nature education classes, and the park's ranger takes school children on nature walks.

Over the years, improvements have been made: upgrading and reopening the park's small zoo, closed for nine years for restoration; replacement of the old rowboats with paddle boats; restoration of the carousel as a piece of folk art; and construction of an ice-skating rink (visitors used to skate on the lake in the winter, but many fell in).

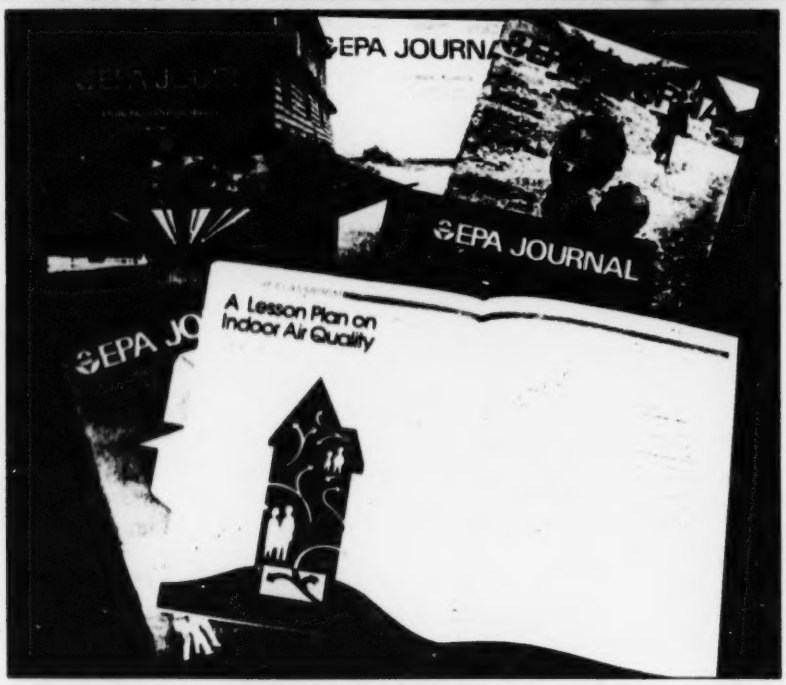
All these points of interest and improvements notwithstanding, the forests, lawns, and plantings have been deteriorating. The number of people visiting the park has doubled in the past 20 years to its current level of six million a year, most of them from within a 20-block radius of the grounds. Off-road biking and the trampling of many feet compact the soil, encouraging erosion during heavy rain and leaving tree roots exposed. Vandalism and the consequent clearing of low growth to enhance security added to the problems.

The restoration work, like the original park construction, will be done by hand. According to the park's information office, Prospect Park Alliance funds are expected over the 25 years to pay for 40 miles of snow fence to shield new plantings; 90,000 feet of logs to be used as anti-erosion barriers on hillsides and to further protect new plantings; 240,000 wildflowers, 134,337 trees, and a vast amount of topsoil to restore areas where the earth has worn or washed away. An example of the painstaking work is that being done to restore the artificial Ravine, which runs through the center of the park. Compacted soil is being loosened with shovels and planted with blueberry bushes and other species that take up fertilizers from the soil before they can leach into the lake. Non-native trees like sycamores are being removed.

Tupper Thomas, the park administrator, and Edward Toth, head of the landscape management office, hope to recreate the woodlands that existed in pre-Revolutionary War times. Their success depends, in part, on keeping the squirrels from digging up the thousands of hickory nuts being planted.

A lot of the work will be done by volunteers recruited by the Alliance, which provides an eight-week training course in horticulture techniques, forest ecology, basic botany, Prospect Park history, and park programs. Payment for the course is 50 hours of volunteer time over two years. A major kick-off and celebration of the Prospect Park renewal was the weekend-long "You Gotta Have Park" annual festival in late May, dedicated to volunteerism and community involvement in parks.

Betty Smith, no doubt, would find inspiration in all the new trees growing in Brooklyn. ❑



Steve Delaney photo EPA

EPA Journal As a Classroom Tool

An interdisciplinary unit can be built around the magazine

by Stephen Tchudi and Nancy Starnes

In a number of past issues of EPA Journal, *we have provided "For the Classroom" exercises tied to particular themes explored by the magazine—e.g., pollution prevention, indoor air quality, and clean water, among others. In this article, we shift focus somewhat: We want to move beyond the specific lessons we've done to suggest how teachers can use* EPA Journal *(or various other popular science/environmental magazines) to create their own interdisciplinary units and activities. Our planning strategy is outlined in the figure on the following page which features some of our notes from the pollution-prevention issue (July-September 1993).*

A longer version of this article will appear in the November 1995 issue of English Journal.

Identifying Central Disciplinary Concepts

Although we favor "seamless" interdisciplinary teaching, where no disciplinary boundaries are required, we've created three major divisions in the figure to reflect the curriculum reality of most schools: For the likely future, we will still be teaching subject clusters of math/science, humanities/arts, and community/vocational concerns.

We begin creating our units by reading the articles in *EPA Journal* and noting the key ideas or concepts under each of the major subject-area headings. In the pollution-prevention issue, for example, we found math concepts dealing with estimation, calculation of probabilities, and all manner of statistics; we discovered science/technology topics centering on chemical reactions, industrial processes, and materials science; we identified humanities/arts concepts related to group dynamics and organizational hierarchies, design aesthetics, and economics. In the community/vocational category, we identified concepts related to the side effects of toxic waste, the costs of cleanup to communities, and careers in pollution prevention.

Those concepts were just the tip of the conceptual iceberg, by the way. We have found that a typical thematic issue of a publication like *EPA Journal* may contain hundreds of interdisciplinary concepts. In planning our units, we content ourselves with jotting down the most prominent few.

The focal concepts for a unit can be further developed through an examination of the school or district study guide in the various disciplines. For example, an English/language-arts teacher can ask faculty members in social studies, science, math, the arts, and the vocational fields to supply summary statements of their aims and goals for the year.

As the figure suggests, we also believe that teachers should factor in their own interests and backgrounds (What do *you* know already about pollution prevention?). We also believe in involving students in describing additional questions, themes, and topics they'd like to explore (What do they *really* want to learn?). After giving students some orientation to the topic (perhaps using the "For the Classroom" exercises we have presented in previous issues of *EPA Journal*), the teacher can use brainstorming or webbing to get the students to identify some crucial questions for unit study.

Finding Resources

A single issue of *EPA Journal* (or a similar magazine) may be all the teacher needs as an information base for a unit, but additional resources are very helpful. Classroom texts are one possibility.

Beyond the textbooks, most school and public libraries have a good supply of materials on environmental and other science themes. A quick search through a library catalog will turn up dozens of books, from accessible adult literature to fiction and nonfiction written expressly for young adults or children. Local environmental issues may well be covered in bin or pamphlet files that one can find most easily by talking directly with the librarian. The catalog or the librarian can also help you learn about relevant videos, documentary films, and other media resources that can be valuable in a unit.

We also recommend conducting a careful review of the current television guides in the newspaper, with a particular eye toward the offerings of PBS, Arts & Entertainment, the Discovery Channel, and the Learning Channel.

If you have access to any computer networks through, say, the Internet, Bitnet, America Online, CompuServe, or Prodigy, you can also find additional information sources and very likely a bulletin board or two that you or your students can explore. *EPA Journal*, for instance, is newly available on Internet.

We are particularly keen on the use of community-based resources, and our unit plans for *EPA Journal* typically include projects encouraging kids to call up community leaders and agencies, executives in business and industry, and county and state officials. Students can schedule interviews, line up classroom speakers, and obtain reams of free or inexpensive material.

Students can also contact federal government sources, which can supply good reading material on almost any interdisciplinary topic one can name. (See partial resource list at the end of this article.)

Whether one works strictly with a single issue of a magazine or does a fairly extensive search, the aim is to get enough materials into the classroom so that students can learn about the topic and then move toward hands-on class-

Classroom Planning with *EPA Journal*

Topic:	Pollution Prevention		
	Math/Science	**Humanities/Arts**	**Community/Vocational**
Central Concepts	Estimation	Group dynamics	Local problems
EPA Journal	Statistics/probability	Values of Thoreau, Franklin	Environmental careers
Curriculum	Chemical reactions	Design aesthetics	Costs of cleanup
Teacher/student	Materials science	Economics	Future planning
Resources	Pollution prevention issue of *EPA Journal*		
EPA Journal	General science textbook chapter on environment problems		
Class Texts	Books such as *50 Things You Can Do to Save the Earth*		
Library	Materials from Federal Reclamation Bureau: Project WET		
Media	Materials from EPA Information Center		
Networks	County agricultural extension service representative		
Community Resources	Parents who work in environmentally related jobs		
Classroom Activities	"Fifty-Two Pickup" game to demonstrate pollution-prevention problems		
Whole class	Discussion: Clean your room: now or later?		
Small group	Water filtering exercise from Project WET		
Individual projects	Small group and individual research into local disposal of grass, paper, Styrofoam and plastics, toxic chemicals, dead batteries, oil, glass, and photographic chemicals		
	Class visit to city council meeting on pollution issues		
Assessment/Performance	Schoolwide pollution-prevention week, with posters, articles in school paper, launching recycling projects		
Displays	Class debate on cleaning up now rather than later		
Writing	Individual presentations on local disposal problems		
Community Action	Campaign to get school lunchroom to reduce waste		
Individualized Assessment	Student presentations on careers in environmental-disposal/pollution-prevention areas		
	Letters to editor of local/regional newspapers		

room activities. The quality and diversity of those activities, as well as their intrinsic interest to students, are likely to be roughly proportional to the depth and richness of resource materials offered by the teacher.

Planning Classroom Activities

There is no easy formula for planning interdisciplinary activities. We tend to stare at our accumulated resources until teaching ideas start to flow: "Ah, here's how we could use that article." "And let's think about using tonight's PBS special in the unit." Our three rules of thumb are to:

- Start with whole class introductory lessons to tune kids in to the topic, to provide them with necessary background information, and to get them involved in raising questions on their own.

- Use "hands on" learning where possible, employing concrete objects, classroom experiments and experiences, and community resources to make the learning alive and lively.

- Move beyond information to "metacognition," thinking about issues, problems, and ways of knowing. For example, students might read several articles in the October-December 1993 *EPA Journal*, which focuses on indoor air quality, and consider how scientists figure out relationships between air quality and health. Students could look for answers to questions such as these: How do we know that invisible pollutants are really in the air and that they are harmful to people? How can the government be sure that there is a relationship between visible or invisible pollutants and health? What does it mean to "prove" something? What do we accept as evidence? And how do our own values warp our evaluation of evidence?

Assessment/Performance

We're committed to the concept of authentic assessment through performance: Rather than looking at test scores, we ask, "What is it that kids can *do* with their learning?" For the unit on indoor air quality (as with almost any environmental or other science/technology issue), learning leads to displays, performances, and exhibits, invariably drawing on and enhancing literacy skills. Students' understanding of the issues can foster their creation of posters or displays on radon problems and detection; a newsletter or pamphlet describing the complications of and alternatives to asbestos removal; a cartoon showing how carpets, even new ones, may serve as sources of indoor air pollution; a panel discussion or debate over passive smoke inhalation and the development of "smoke free" environments. Other projects might include: a research notebook, with pamphlets, advertisements, interview notes, journal entries, hypotheses and conclusions; a paper, perhaps done as a common school report or research paper, or possibly a piece of imaginative writing, such as a science fiction story on an environmental theme; a poster, advertisement, bumper sticker or other concise summary/display of findings; or an oral presentation, panel, discussion, seminar, or debate.

To assess the results of these units, let's go back to our original listing of concepts in math/science, humanities/arts, and community/vocational. The beauty of authentic assessment, we think, is that student projects and performances make it abundantly clear whether those concepts have been covered: Either a project demonstrates the target ideas or it doesn't.

Moreover, we often find that interdisciplinary projects lead to coverage of a wide range of unanticipated concepts. A project on passive smoke inhalation may lead to a discussion of smoker's rights, which may grow into a discussion of human rights generally—and may then lead to a debate over the political ideals of figures such as Henry David Thoreau or Benjamin Franklin. When that happens, we carefully note down what has taken place, as an example of how interdisciplinary learning covers far more than the "basics" and often covers the mandated curriculum in far more depth and detail than the mandators dreamed. ❑

(Dr. Tchudi is Professor of English at the University of Nevada, Reno, where he teaches interdisciplinary programs and edits The Phoenix, *the newsletter of the Assembly on Science and Humanities of the National Council of Teachers of English. Until recently, Starnes was an Assistant Editor at* EPA Journal *in the Senior Environmental Employment Program.)*

Resources at EPA

EPA Journal. Published quarterly by the Environmental Protection Agency. Available from the Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954. Subscription $7.50 per year. Available on Internet (text only) at gopher.epa.gov or http://www.epa.gov/

EPA Public Information Center. Phone: 202 260-2080 or -7751. (For non-technical information on environmental topics such as drinking water, air quality, pesticides, and indoor air.)

Other Federal Information Sources on Environmental Issues

Bureau of Reclamation. Phone: 303 236-9336. (Sponsors of Project WET: Water Education for Teachers)

Civilian Radioactive Waste Information Center. Toll-free phone: 800 225-6972.

Department of Agriculture Extension Service. Phone: 202 720-5727. (Ask for guides to the "Ag in the Classroom" program.)

Energy Efficiency and Renewable Energy Clearinghouse. Toll-free phone: 800 523-2929. (Information on solar and wind power)

Fish and Wildlife Service, Office of Training and Education, Publication-Unit. Phone: 703 358-1711. (Information on endangered species, wildlife refuges, pesticides, and wetlands)

Forest Service. Phone: 202 205-1545. ("Project Learning Tree" and other information on conservation and resource use)

Geological Survey, Educational Outreach Program. Phone: 703 648-4460. (Information and teachers' packets on earth science, natural resources, surface water, mineral research, and climate change)

Mineral Management Service. Phone: 703 787-1080.(Brochures and other publications on oil-spill prevention, marine animal protection, and coastal restoration)

National Oceanic and Atmospheric Administration (NOAA). "Ask NOAA." Phone: 202 606-0500.

Soil and Water Conservation Society. Toll-free phone: 800 THE SOIL. (Information on soil/water, watersheds, and conservation. Also call 202 720-0430 to learn about the Earth Team, a national volunteer group for children 14 years or older.)

ON THE MOVE

Jean Nelson has been named Counselor to the Administrator. In this new position, she will take on various special projects. The first of these is the United Nations' Fourth World Conference on Women, to be held in Beijing this September. This work is a continuation of her involvement in the 1994 International Conference on Population and Development and her preparatory work for the Conference on Women.

From the fall of 1993 until taking on her new role, Nelson served as EPA's General Counsel. In this post, she dealt with a variety of environmental issues across all media and with a number of Agency initiatives.

Prior to joining EPA, Nelson was Chief Deputy Attorney General for the Tennessee Attorney General for four years. From 1979 to 1988, Nelson was a partner in the Nashville, Tennessee, law firm of Gullett, Sanford, Robinson, and Martin. She was an associate with the firm from 1975 to 1979. While in Tennessee, she held leadership positions—including a number of environmental roles—in state and local Bar activities and in many other community organizations.

Nelson received a bachelor's degree in 1969 and a law degree in 1975 from Vanderbilt University.

EPA's acting General Counsel is **Jon Cannon**, who has been Assistant Administrator for the Office of Administration and Resources Management (OARM) since 1993. **Sallyanne Harper**, who has been Deputy Assistant Administrator since 1992, is OARM's acting Assistant Administrator.

Kevin P. Varney is EPA's new Deputy Chief of Staff in the Office of the Administrator, where he is responsible for long-term and strategic planning. Before joining EPA, he served as the Director of Scheduling and Advance at the Department of the Treasury from 1993 to 1995. He worked closely with then-Secretary Lloyd Bentsen, supervising the Secretary's schedule, directing advance operations, and accompanying and briefing the Secretary during domestic and international trips.

Before joining the Treasury Department, Varney served on the Presidential Inaugural Committee as a director in the Office of the First Family, where he developed the schedule of events for the President's family. During the Clinton/Gore '92 campaign, he was on the national advance staff and travelled the country setting up campaign events for then-Governor Clinton. He also served as coordinator of the three presidential debates.

Earlier, Varney was in the restaurant business in Salt Lake City. He received his bachelor's degree in political science from the University of Utah in Salt Lake City in 1983. He also attended the London School of Economics on a one-year program from 1981 to 1982.

Scott Fulton is EPA's new Principal Deputy General Counsel. In this position, he will serve as the Agency's senior career legal adviser.

Before joining the Office of General Counsel, Fulton served as the Deputy Assistant Administrator to EPA's Office of Enforcement and Compliance Assurance. There, he played a key role in establishing bilateral enforcement relations with Mexico and in fundamentally reorganizing the Agency's enforcement program. Fulton joined EPA in 1990 as Director of the Agency's civil enforcement program.

From 1986 to 1990 he was Assistant Chief of the Environmental Enforcement Section of the U.S. Department of Justice; from 1985 to 1986, Senior Attorney; and from 1982 to 1985, Trial Attorney. In the Department of Justice he handled a number of precedential enforcement cases and participated in the *Exxon Valdez* prosecution. In 1984, he served as Special Assistant U.S. Attorney at the U.S. Attorney's Office in the District of Columbia.

Fulton received a bachelor's degree in business management from the University of Massachusetts in 1976 and a law degree from the University of South Carolina School of Law in 1982.

Sylvia K. Lowrance is the new Deputy Assistant Administrator for the Office of Enforcement and Compliance Assurance.

Lowrance came to EPA in 1979, and has extensive experience in environmental management. She has served as Associate Deputy Administrator for the past two years. She was a key advisor to the Administrator on environmental policy and manage-

ment issues, and managed the development of a number of environmental initiatives. She provided leadership on a broad array of environmental issues, including improvement of Agency science programs, risk assessment, and reform legislation, as well as key air, water, and waste policies. She led a number of management initiatives to improve agency planning and budgeting and to reorganize regional enforcement.

In 1988, she became Director of the Office of Solid Waste (OSW), where she was responsible for developing and implementing hazardous and solid waste programs under the Resource Conservation Recovery Act (RCRA) and other related laws. Lowrance has worked in policy and management positions in EPA's RCRA, Superfund, and Waste Enforcement programs and in the Office of Emergency and Remedial Response and the Office of Water. She also teaches environmental law at the George Washington University Law School.

Before joining EPA, she was a government relations representative for several national trade associations. Her many awards for excellence in public service include the Presidential Award for Meritorious Service in 1992.

She received a bachelor's degree from the University of Michigan in 1975 and a law degree from the Catholic University of America in 1982.

Jim Mathews is Deputy Assistant Administrator for the Office of Solid Waste and Emergency Response.

Before coming to EPA, Mathews was Staff Director for the Subcommittee on Fisheries Management, U.S. House Committee on Merchant Marine and Fisheries, from 1993 to 1995. He was Senior Legislative Assistant (energy and environment) for Congressman Thomas J. Manton (D-New York) from 1986 to 1995. At Friends of the National Zoo, he was Special Assistant to the Executive Director from 1984 to 1986. He worked as an independent consultant from 1983 to 1984.

Other positions Mathews held include: Senior Legislative Assistant for U.S. Senator Nicholas F. Brady (R-New Jersey) from 1982 to 1983; and Special Projects Assistant, Legislative Assistant (energy and environment), and Legislative Director for U.S. Senator Harrison A. Williams, Jr. (D-New Jersey) from 1976 to 1982.

Mathews received a bachelor's degree in international relations from Lehigh University in 1976 and pursued graduate studies in international affairs at the George Washington University from 1976 to 1978.

Dana D. Minerva is EPA's Deputy Assistant Administrator in the Office of Water.

Since 1993, she served as Special Counsel in the Office of the Administrator. There, she was responsible for developing consensus on administration positions concerning regulations for all of EPA's offices. She came to EPA from the Florida Department of Environmental Regulation, where she served in several positions, including Assistant Secretary. In this position, she took on many tasks associated with managing the 1,700-person department, particularly in the areas of water management and the department's cooperative efforts with federal, state, and local agencies.

From 1989 to 1990, Minerva was Staff Director of the Florida House of Representatives Committee on Natural Resources, following six years as an attorney to Florida House and Senate committees. In these positions, she helped create many of Florida's environmental statutes, including the Growth Management Act of 1985, the Surface Water Improvement and Management Act, and Preservation 2000, the law creating the nation's largest environmental land-acquisition program. She also worked for a year at the Florida Department of Community Affairs, providing legal advice for the drafting and adoption of state rules on local land-use plans.

Minerva received a bachelor's degree in political science from Stetson University and a law degree and master's degree in urban and regional planning from Florida State University.

William H. Sanders, III, is EPA's new Director of the Office of Pollution Prevention and Toxics.

Dr. Sanders has widespread experience within EPA. In 1994, he served as the Agency's Senior Executive for Resources Management Training in the Office of Administration and Resources Management. From 1979 to 1994, he directed the Environmental Sciences Division of EPA's Region 5; he previously served as Deputy Director of the Water Division (1976 to 1979). From 1975 to 1976, he was Chief of the Michigan Program Education Section. Sanders began his

career at EPA in 1973 as a civil engineer in the Water Division.

His numerous awards include the Agency's Gold Medal in 1992 for outstanding service on environmental equity, and the National EEO Award in 1994.

Sanders received a bachelor's degree in civil engineering from the University of Chicago in 1969, a master's degree in Management Public Service in Quantitative Methods from DePaul University in 1974, and a doctorate in public health from the University of Illinois at Chicago, School of Public Health, in 1992.

Penelope A. Fenner-Crisp is EPA's new Deputy Director of the Office of Pesticide Programs. Dr. Fenner-Crisp has held several positions within EPA since joining the Agency in 1978 as staff toxicologist. For the last five years, she has been director of the Health Effects Division in the Office of Pesticide Programs; before that, she was Director of the Health and Environmental Review Division of the Office of Pollution Prevention and Toxics from 1987 to 1990.

Before joining OPPT, she served as Senior Toxicologist in the Health Effects Branch of the Office of Drinking Water from 1980 to 1987. While she was there, she was Manager of the Health Advisory Program, responsible for the process by which the office developed its nonregulatory health-based guidelines. In addition, she served as a member of several groups working in the area of risk assessment, such as the Risk Assessment Technical Committees, the Risk Assessment Forum, and the Steering Committee of the Science Policy Council.

Earlier, Fenner-Crisp was Adjunct Instructor in the Anatomy Department and Research Associate in the Pharmacology Department at Georgetown University Schools of Medicine and Dentistry. In 1975, she was Visiting Scientist in the Psychology Department of the University of Birmingham, Birmingham, England.

She completed a postdoctoral fellowship in pharmacology-morphology from the Pharmaceutical Manufacturers' Association Foundation in the Anatomy Department of Georgetown University Schools of Medicine and Dentistry, with emphasis on reproductive endocrinology.

Fenner-Crisp received a bachelor's degree in zoology from the University of Wisconsin-Milwaukee and master's and doctorate degrees in pharmacology from the University of Texas. ❑

List of Contributors

Diane Berger (1707)
Program Analyst
Environmental Education Division
EPA Headquarters
401 M Street, SW
Washington, DC 20460
Phone: 202 260-8747
Fax: 202 260-0231

Noel J. Brown
Former Director
United Nations Environment Programme
Phone: 212 370-4146 (message only)
Fax: 203 966-2305

Carol M. Browner (1101)
Administrator
EPA Headquarters
Phone: 202 260-4700
Fax: 202 260-0279

Gregory Budd
Health Physicist
Office of Radiation and Indoor Air
EPA Las Vegas Laboratory
4220 S. Maryland Parkway
Building C
Las Vegas, NV 89119
Phone: 702 798-3121
Fax: 702 798-2465

Senator John H. Chafee
410 Dirksen Senate Office Building
Washington, DC 20510
Phone: 202 224-6176
Fax: 202 224-5167

Don Curry
Teacher
Silverado High School
1650 Silver Hawk Avenue
Las Vegas, NV 89123
Phone: 702 799-5790 ext. 222
Fax: 702 799-5744

Doris Gillispie (1707)
Youth Programs Coordinator
Environmental Education Division
EPA Headquarters
Phone: 202 260-8749
Fax: 202 260-0790

Arva Jackson
Chairman
EPA Environmental Education Advisory Council
11629 Regency Drive
Potomac, MD 20854
Phone/Fax: 301 983-9439

Julie Jubeir
Director of Educational Programs
Management Institute for Environment and Business
1101 17th Street, NW
Suite 502
Washington, DC 20036
Phone: 202 739-0149
Fax: 202 833-6228

David Lutz
Program Director
Neighborhood Open Space Coalition
72 Reade Street
New York, NY 10007
Phone: 212 513-7555
Fax: 212 385-6095

Paul F. Nowak, Sr.
National Consortium for EPA Environmental Education and Training
430 East University Avenue
School of Natural Resources and Environment
University of Michigan
Ann Arbor, MI 48109-1115
Phone: 313 998-6726
Fax: 313 936-2195

Roy Popkin (1704)
Writer/Editor
Editorial Services Division
EPA Headquarters
Phone: 202 260-2069
Fax 202 260-0231

Thomas Pyke
Director
The GLOBE Program
744 Jackson Place
Washington, DC 20503
Phone: 202 395-7600
Fax: 202 395-7611

Abby Ruskey
Coordinator
National Environmental Education Advancement Project
College of Natural Resources
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
Phone: 715 346-4179
Fax: 715 346-3819

David Rockland
President
National Environmental Education and Training Foundation
915 15th Street, NW
Washington, DC 20005
Phone: 202 628-8200
Fax: 202 628-8204

Stephen Tchudi
Professor
Department of English
University of Nevada
Reno, NV 89557-0031
Phone: 702 784-6709
Fax: 702 784-6266

Richard Wilke
Associate Dean
College of Natural Resources
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
Phone: 715 346-2251
Fax: 715 346-3624

David Woollcombe
President
Peace Child International
The White House
Buntingford
Hertfordshire SG9 9AH
United Kingdom
Phone: 011 44 176 327-2259
Fax: 011 44 176 327-4460

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Children discover water life on a class excursion.

Back Cover: Wisconsin high school students visit a wastewater-treatment plant.

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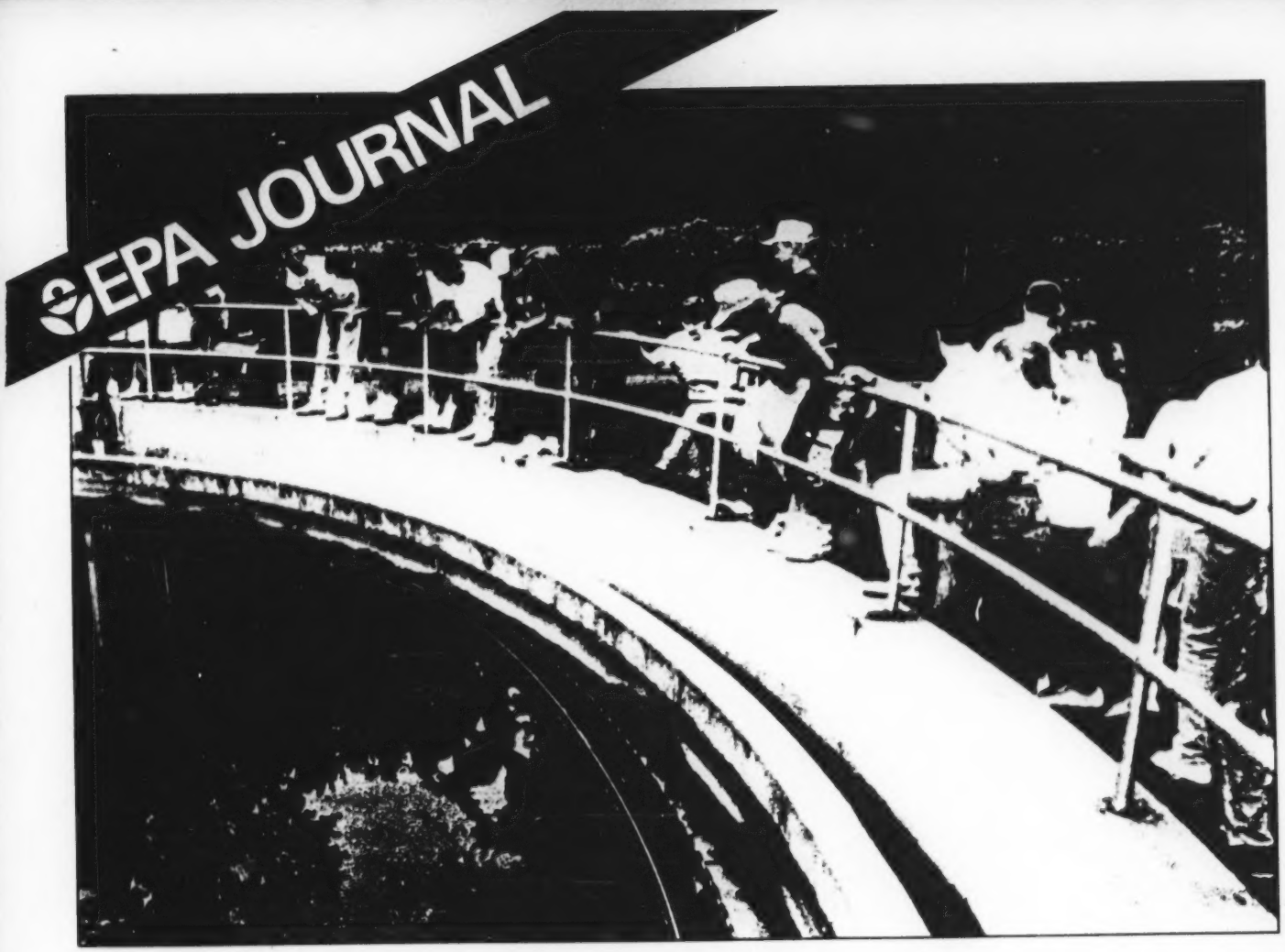

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